THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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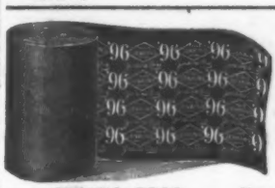

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THURSDAY, JANUARY 7, 1904.

Modernization in Engine Building.

The New Plant of the Hooven-Owens-Rentschler Company.

An Interesting Example of Specialization, Where Accuracy and Economy in the Construction of Large Horizontal Corliss Engines are Attained by Means of Huge Special Tools.

With a view of producing along the lines of the highest efficiency and economy, the Hooven-Owens-Rentschler Company of Hamilton, Ohio, have within the last year reconstructed their entire plant and more than doubled it as to productive capacity. In accomplishing this they have not only arranged the buildings and their equipment along most approved lines, but they have installed a number of specially designed tools of great capacity and adaptability. These tools were designed particularly to meet the requirements of building the Hamilton Corliss engine with as great a degree of accuracy and as near to the designer's ideal as it is possible to do it. The principle on which these tools are designed permits them to perform all of the principal operations on a piece of work in one setting, and in many instances simultaneously. In this manner they not only insure truth of alignment of the various finished surfaces and bearings, but also turn out their product at a much lower cost than can be done by ordinary means, and thus stand synonymous for both accuracy and economy.

In view of the design of the horizontal Corliss type of engine, which embodies a multiplicity of movements, and therefore bearings, at right angles to one another, and in consideration of the all essential necessity of perfect alignment in order to insure true running of the engine, the prime essential in construction is the method by which the bearings and contact surfaces are obtained. This is the chief feature of interest in the new Hamilton works, although there are numberless meritorious details which by comparison seem minor, but nevertheless make for excellence in shop practice. And then, too, the skillful engineering manifest in the arrangement of buildings and equipment contributes in no small degree to the success of the entire organism.

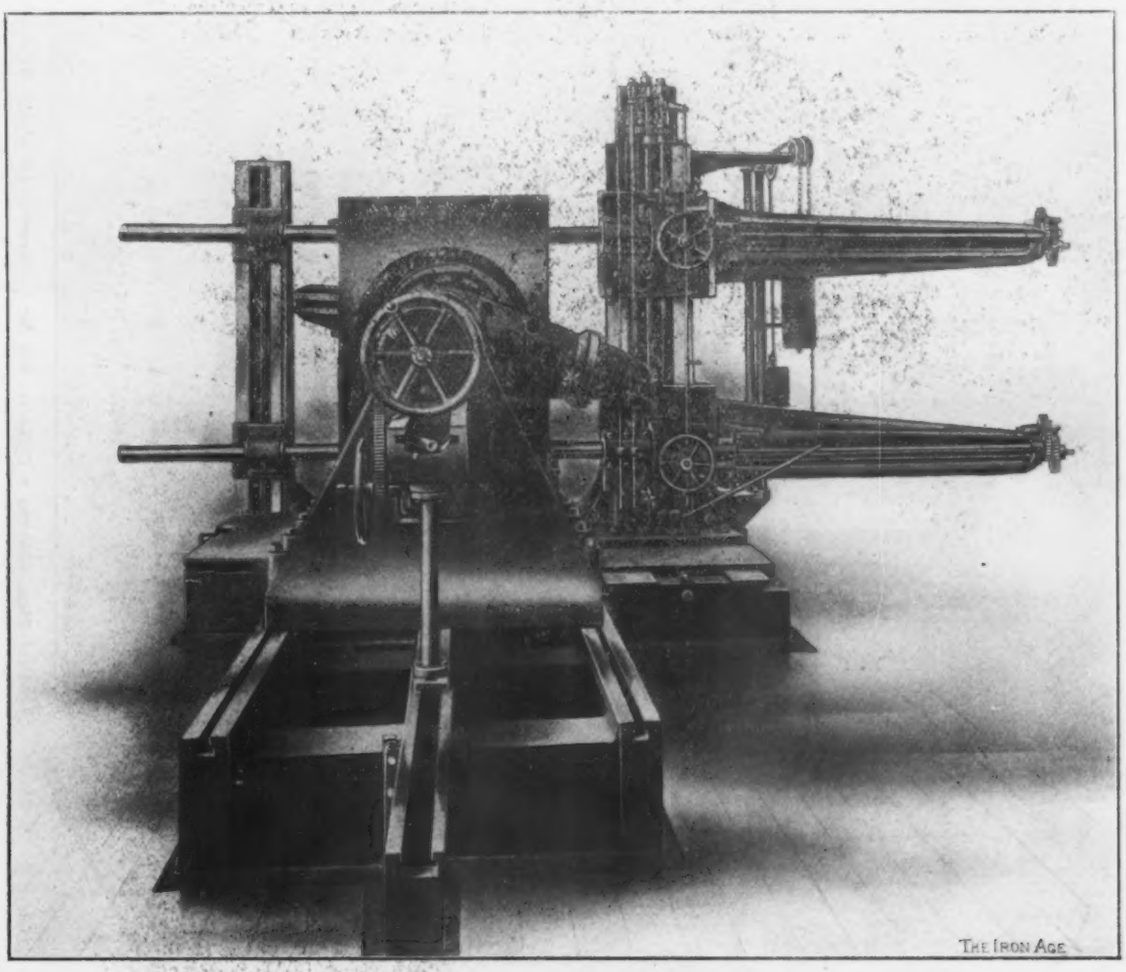

Fig. 1.—Corliss Cylinder Boring Machine.—End View, Showing Valve Port Boring Spindle.

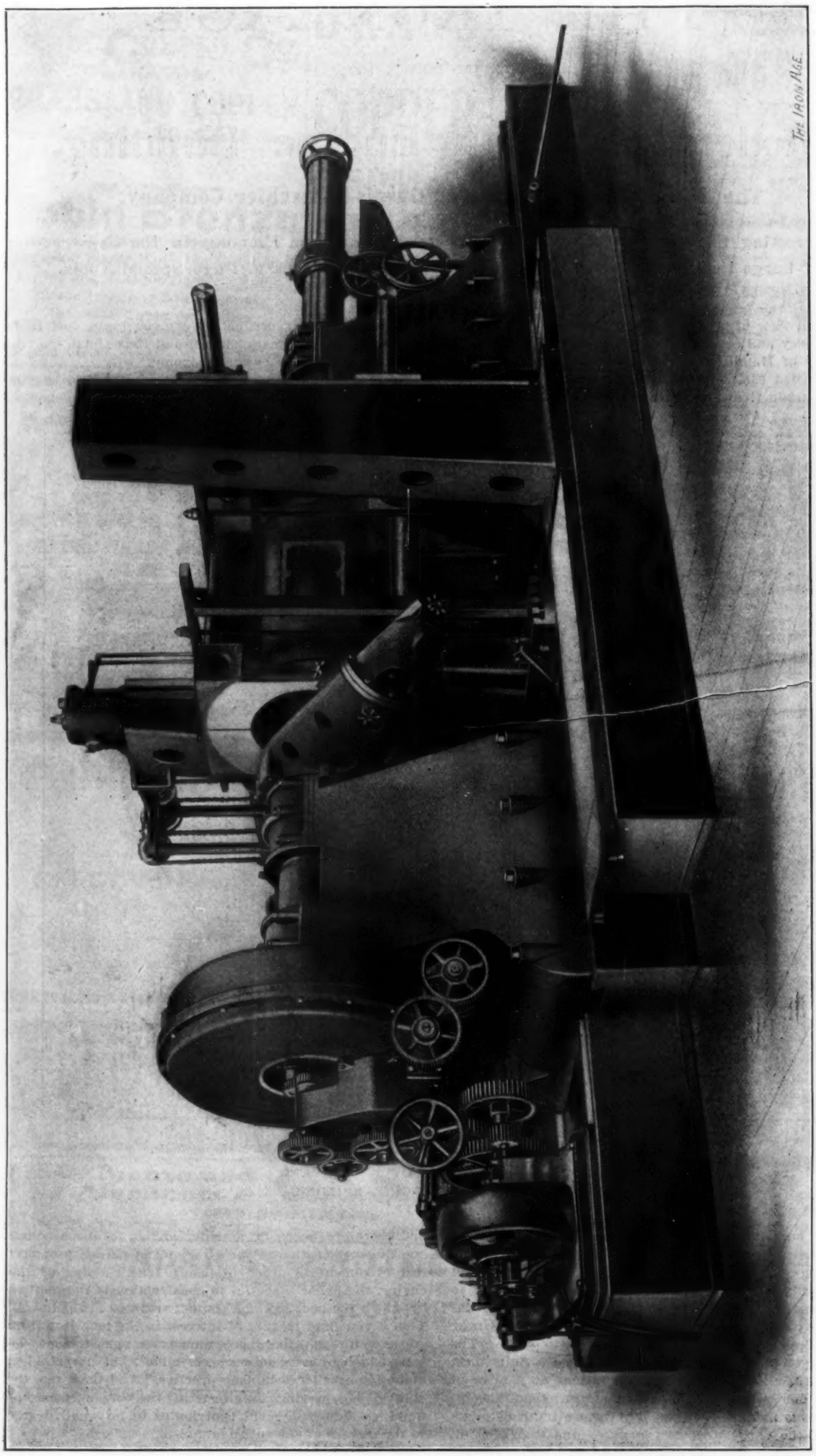

Fig. 2.—Corliss Cylinder Boring Machine.—General View, Showing a Cylinder, Set for Performing All of the Machining Operations Simultaneously.

MODERNIZATION IN ENGINE BUILDING.

The tools which we refer to and illustrate in this article were built at the Niles Tool Works branch of the Niles-Bement-Pond Company, and are all electrically operated, the larger types being provided with individual motors for each of the heavy drives.

The machine illustrated by Figs. 1 and 2 was especially designed for performing the principal operations in the machining of Corliss cylinders. It bores the cylinder, faces the ends and bores two valve ports, all simultaneously. The remaining two valve ports are also bored without resetting the cylinder on the machine.

The cylinder is held at the proper hight by blocking placed upon two movable carriages. The head stock carries the spiral driving gear, the feed mechanism and one facing head. The tail stock is provided with mechanism furnishing hand traverse for the boring bar, and carries the other facing head. It slides on the bed, being adjustable by means of a hand lever, thus providing for adjustment to suit cylinders of differing lengths. The facing heads are mounted on revolving sleeves, through which the bar has a sliding movement. No part of the boring bar is exposed to a running bearing, by which it would be worn out of true.

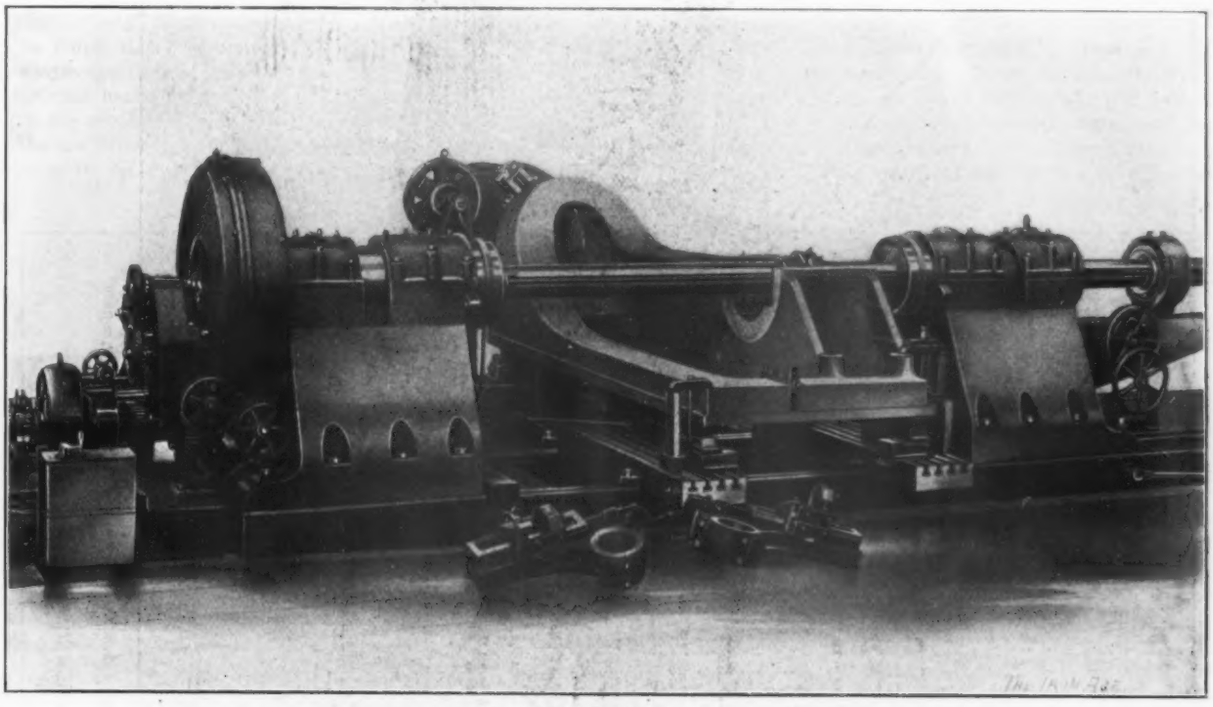

Fig. 3.—Bed Boring and Facing Machine.—Front View, Showing Operation of Boring Main Bearing.

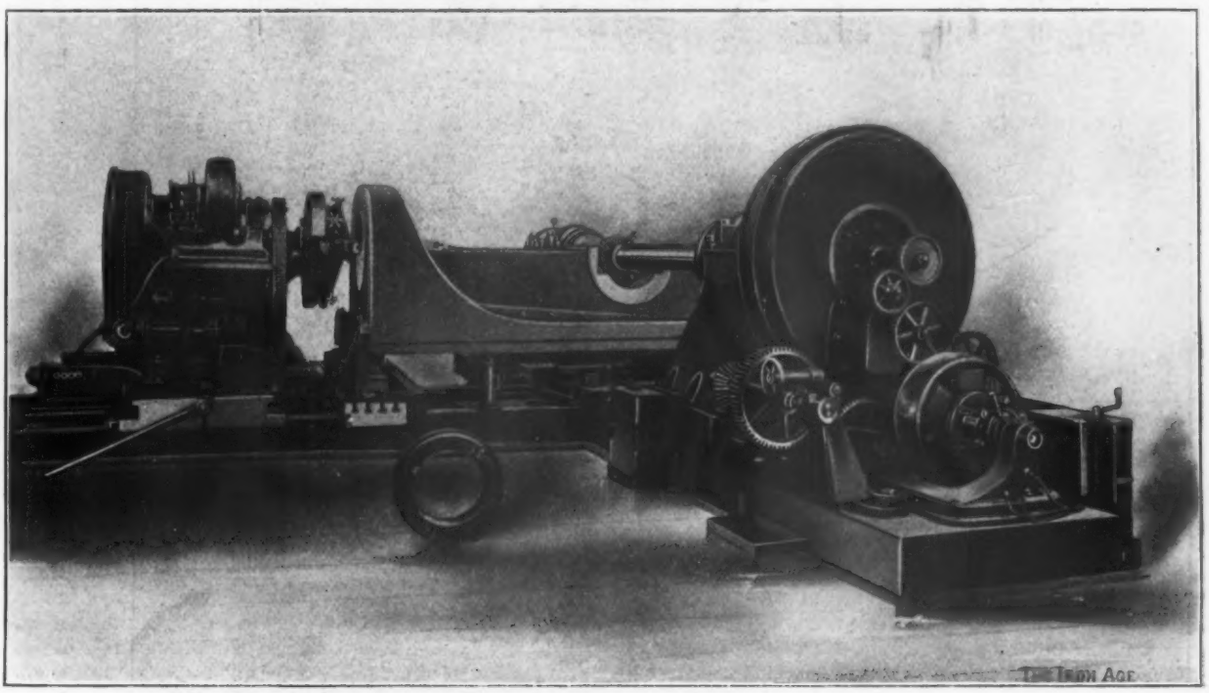

Fig. 4.—Bed Boring and Facing Machine.—Rear View; Facing End of Bed.

MODERNIZATION IN ENGINE BUILDING.

The two valve port boring spindles are carried on the vertical column by movable saddles to allow for adjustment. They have power elevating and lowering device, which operates simultaneously in both vertical columns. They also have power feed devices and quick returns

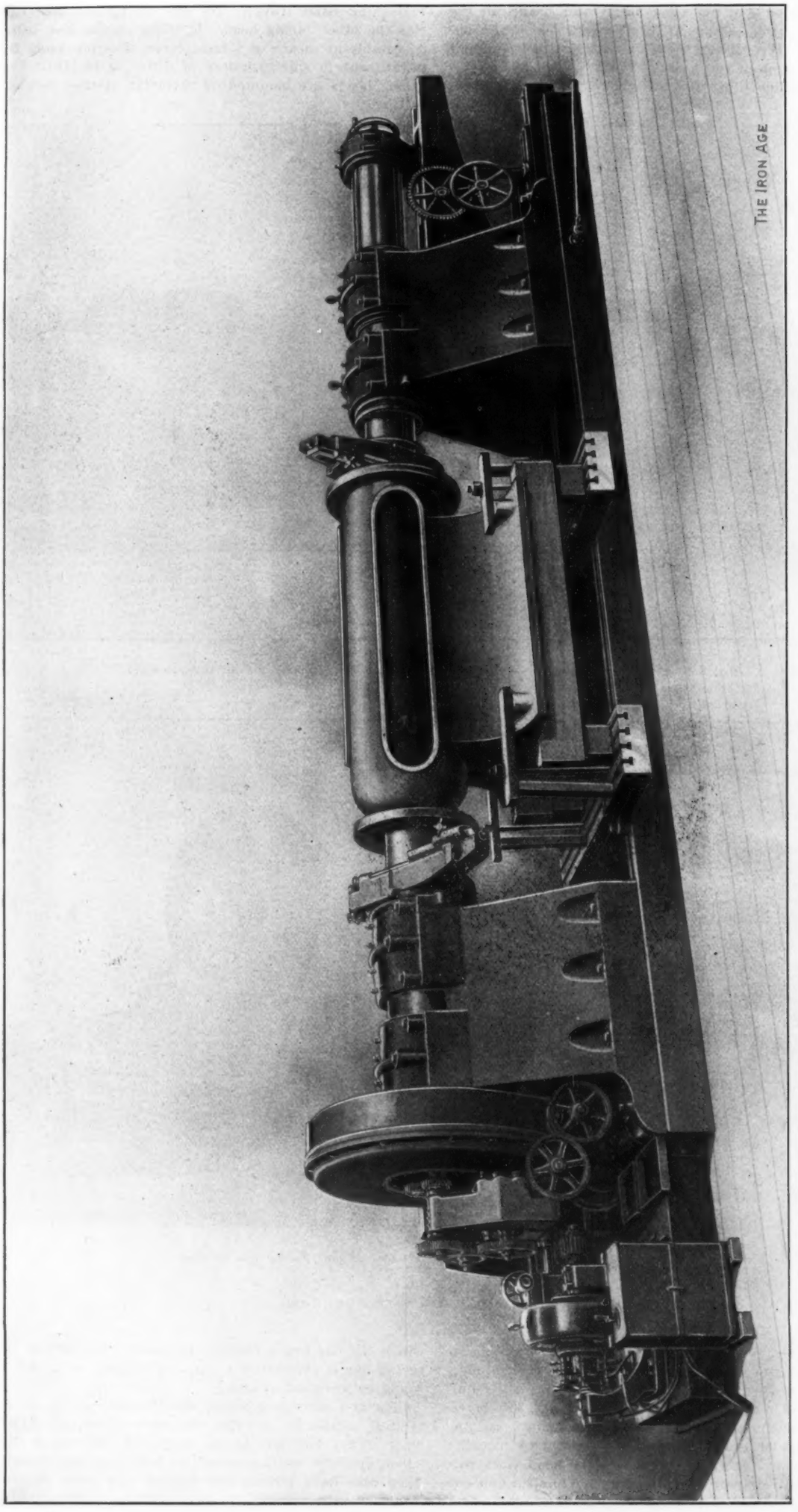

Fig. 5.—Guide Barrel Boring and Facing Machine.—Both Ends Are Faced and the Guides Are Bored Simultaneously.

MODERNIZATION IN ENGINE BUILDING.

operated by hand. As will be noted from Fig. 2, the facing heads are provided with star actuated feeds.

This machine is capable of performing all operations on cylinder castings of 76 inches in head diameter; if used exclusively for boring operations it will accommodate work 96 inches in diameter.

A most important and interesting tool is that used for boring and facing the ends and main bearings of the engine beds. This is illustrated in Figs. 3 and 4. It will be noted that the bed of this machine is built in a T-shape, the design resembling a large lathe with an extra driving head mounted on a bed abutting the lathe bed in the center. The work, it will be noted, is mounted on the machine directly in the center, so that the end which is to be faced is brought close to the rear facing head, while the work on the bearing is accomplished by the aid of the long boring bar on the front lathe-like portion of the machine. The rear facing head and the tail stock of the forward portion of the machine can be moved along the ways, thus providing the adjustment necessary in handling work of different dimensions. Each drive is provided with an individual electric motor. The one operating the main or forward drive is located on the extreme end of the bed and is geared down direct to the spiral drive. In the case of the facing head drive the motor is mounted on top of the drive frame and the power is transmitted by toothed chain to a train of spur gears and thence through a pair of bevel gears to the worm.

In Fig. 3 the machine is shown boring out the bottom of the main bearing before the quarter boxes and cap are placed in position. When this operation is completed the babbitted quarters and cap are secured in position and the bearing is bored to its finished size. Simultaneously with this, the two small facing heads, which in Fig. 3 are shown lying on the floor immediately in front of the machine, are employed in facing off the sides of the entire housings. The boring is performed by means of a ring, such as is shown standing on the floor in the foreground of Fig. 4, which is slipped over the boring bar and into which are inserted three straight cutting tools. These latter are adjusted to give the proper diameter of bore and are fed through the bearing automatically by means of the screw shown imbedded in the boring bar in Fig. 3. The feed screw is rotated by means of the extra train of gearing at the driving head, and which by the changing of ratios alters the speed of the feed.

While the work is progressing in the boring and facing of the bearing the operator adjusts the rear facing head for finishing the surface of the end of the bed to which the guide barrel is to be fastened. This must of necesssity be done precisely at right angles to the main bearing, in order to insure exact alignment and true running of the engine. Owing to the accuracy of construction in the machine itself, a bed when once properly mounted on the machine must be bored and faced true, as both operations are carried on simultaneously without disturbing the setting of the work.

The end facing operation, as shown in Fig. 4, it will be noted, is very simple. The mechanism consists chiefly of a special facing head, which is mounted on the end of the driving spindle, and which contains a star feed mechanism.

As a wide latitude is given for the moving of the tail stock and end facing drive, this machine will perform its operation on the largest engine bed of this type built.

The machine employed in the finishing of the guide

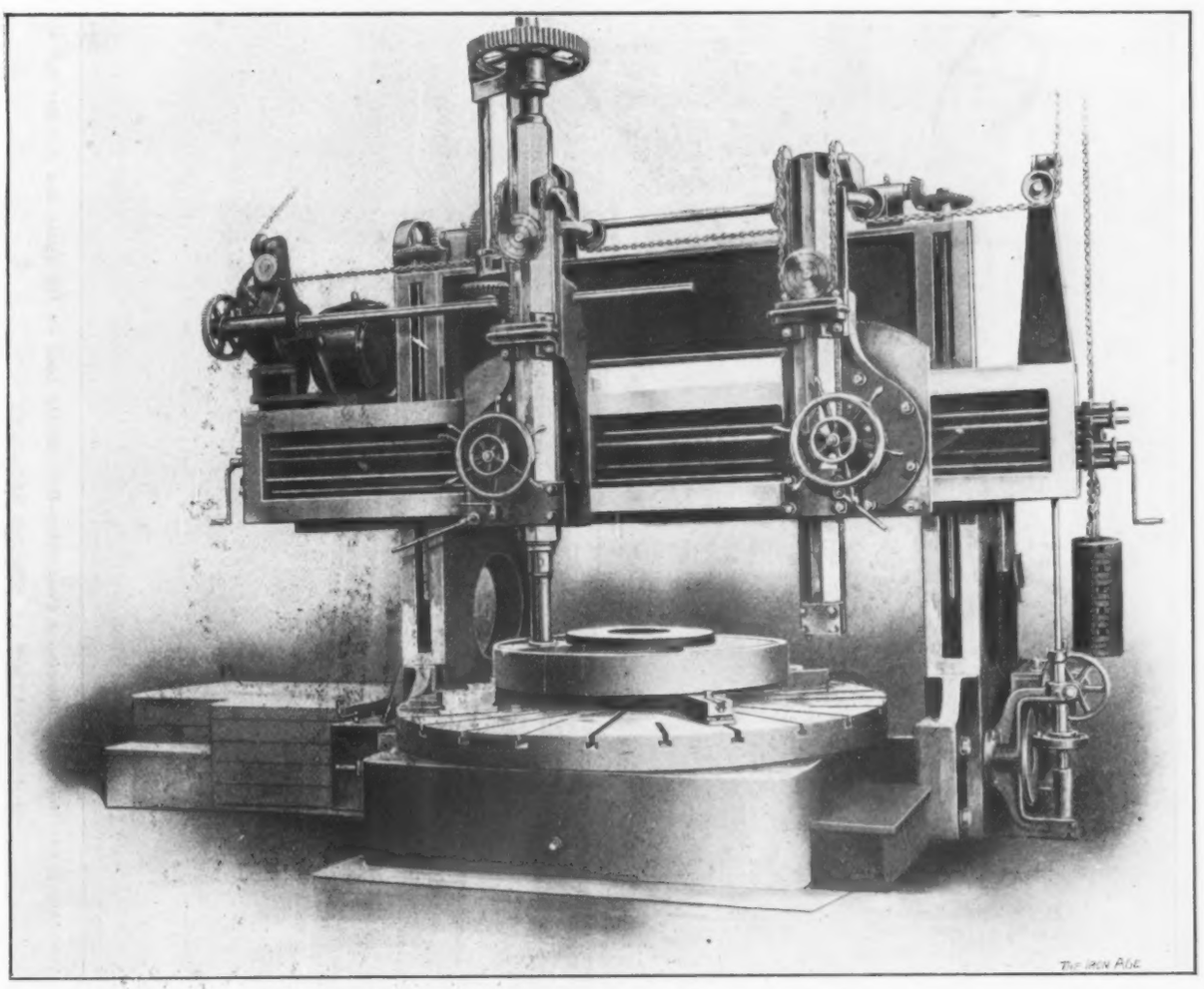

Fig. 6.—Disk Crank Boring, Turning and Facing Machine, Showing the Left Hand Boring Bar Arranged as a Drilling Spindle.

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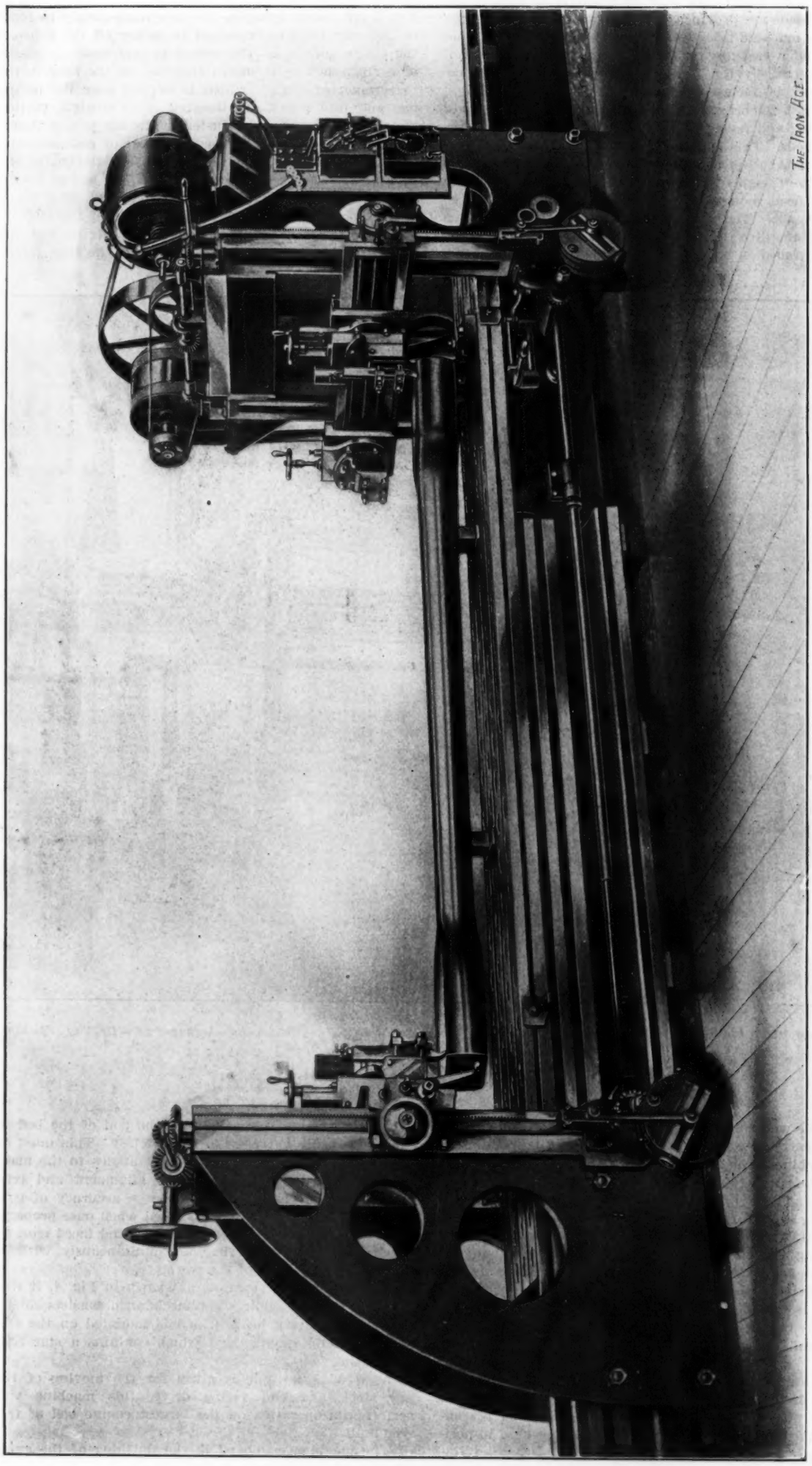

Fig. 7.—Double Planer for Finishing Connecting Rods, Showing a Connecting Rod Simply Laid on the Table and Not Set for Work.

MODERNIZATION IN ENGINE BUILDING.

barrel is just like the forward portion of the bed boring and facing machine. Its essential feature is that it also performs the operations which are at right angles to one another simultaneously at one setting of the work. That this is a very important operation will be realized when it is considered that the guide barrel has fastened to it both ends of the barrel at the same time. In the meantime the guides are being bored through the agency of the boring bar ring and tools precisely as in the boring operation of the bed boring and facing machine. The tail stock can be moved to suit the length of the guide barrel in hand, and it will be observed that the machine

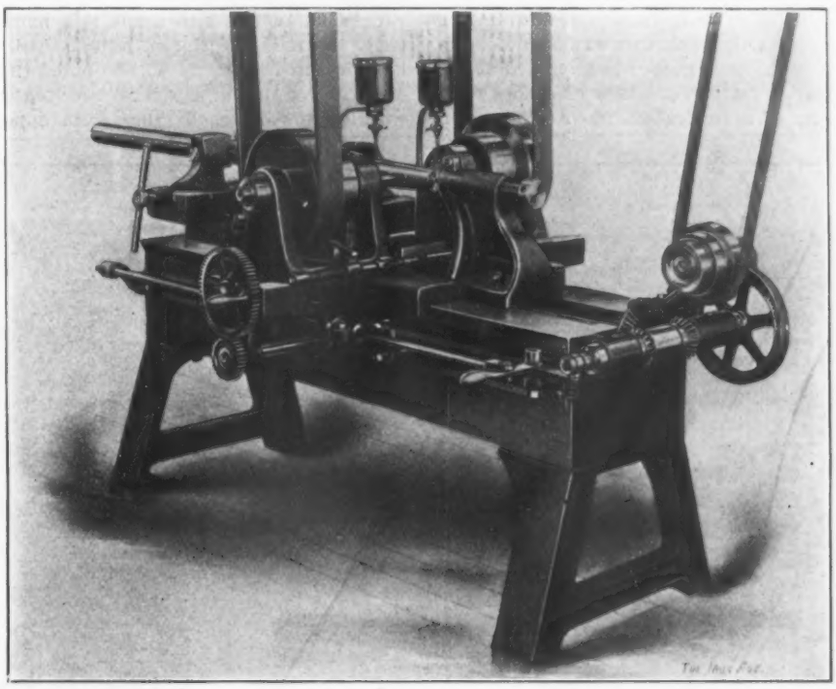

Fig. 8.—Horizontal Cotter Drill, Used for Slotting Piston Rods.

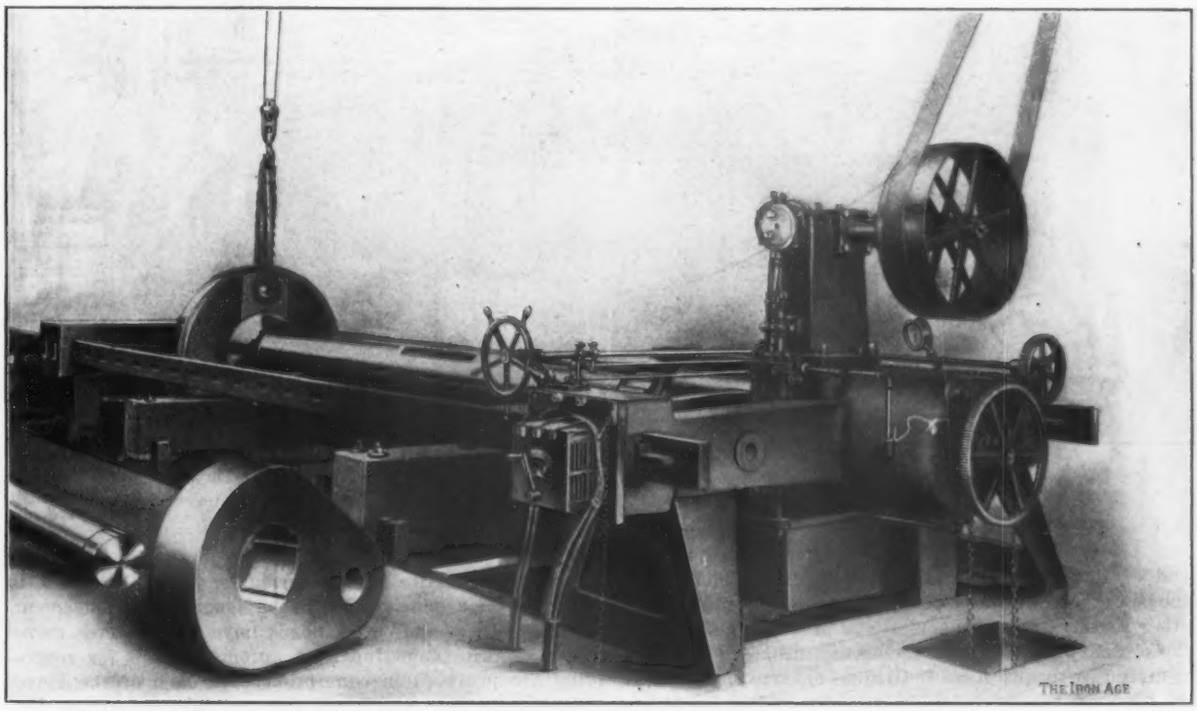

Fig. 9.—Hydrostatic Forcing Press, Used for Forcing Cranks on Crank Shafts.

MODERNIZATION IN ENGINE BUILDING.

the cylinder on one end and the bed on the other. The guides must certainly be bored true, and the relationship of the end flanges to the guides must also be exact. This is accomplished by the use of this machine, as illustrated in Fig. 5. It will be observed that the two facing heads are fastened to the boring bar. They are fitted with star feed arrangements and are operated together, facing off has its motor on the end of its bed, being geared direct to the spiral drive.

Another machine which performs an extra operation without necessitating the resetting of the work is illustrated in Fig. 6. This is a regular 10-foot boring mill, having a special type of boring bar fitted up as a drill spindle and so arranged as to permit its being moved

along the rail. It is used for finishing disk cranks, the special boring and drilling bar being moved to the proper position for boring the crank pin hole while the work is retained in its original setting on the table. While this is done the table is securely locked in order to hold it from revolving. When this bar is not used as a drill spindle it is put to the use of an ordinary boring bar. It will be noted that power is transmitted to this spindle, when it is used as such, from a special motor set on a bracket immediately behind an extended portion of the cross rail. The motor is geared to a splined shaft, to which a bevel gear is feathered, which enmeshes with another at the bottom of a vertical shaft. At the upper end of this shaft there is a spur pinion which drives the spur gear at the top of the drilling spindle. The other features of the machine are practically similar to the ordinary standard 10-foot boring mill. The machine is driven by means of an individual electric motor.

A very ingenious machine is shown in Fig. 7. It is a planer having a double set of housings arranged so that both the forward and backward movements of the table are furnishing cutting power. This is accomplished, of course, by one set of heads cutting on the forward stroke and the other on the return stroke. In the engraving the connecting rod is shown lying on the table after having been finished. In actual practice the rod is set edgewise, so that the two heads carried on each rail may be used, one on each of the flat surfaces. By so doing, not only are both ends of the connecting rod planed simultaneously, but both sides are finished at the same time. The size of the machine is 38 x 38 inches between housings and 18 feet in length of table. The machine is used exclusively for the planing of connecting rods. So as to provide for the handling of work of different lengths the left hand set of housings can very readily be moved along the bed of the machine.

The method of slotting the piston rods is interesting from the standpoint of extreme simplicity. Instead of placing these rods in heavy slotters they are put on a horizontal cotter drill. Here by a double end mill arrangement which both drills and mortises at the same time, the rods are slotted automatically. This machine is shown in Fig. 8. It will be noted that the cutters are each driven by a separate two-step cone, the cutters working toward each other from opposite sides of the work. This entire cutting mechanism, it will be seen, is carried on a slide, which has a longitudinal movement, while both of the cutter heads have a transverse movement. Adjustable stops and automatic trips for reversing are provided in connection with each of the movements, thereby permitting the operator to set the machine, start it and pay no further attention to it until the work is finished. The longitudinal travel of the heads may be adjusted to any length of stroke while the machine is running. The machine has a pair of self centering chuck jaws, which will admit work up to 7 inches in diameter. Sliding centers are also provided for holding short work.

The horizontal hydrostatic forcing press, which is illustrated in Fig. 9, has a capacity of 300 tons. The machine stands parallel with the line shaft, and the tie bars are placed at the sides, leaving the top free for crane chains, the machine being mounted on two parallel base plates on which the sliding head rolls. The cylinder is

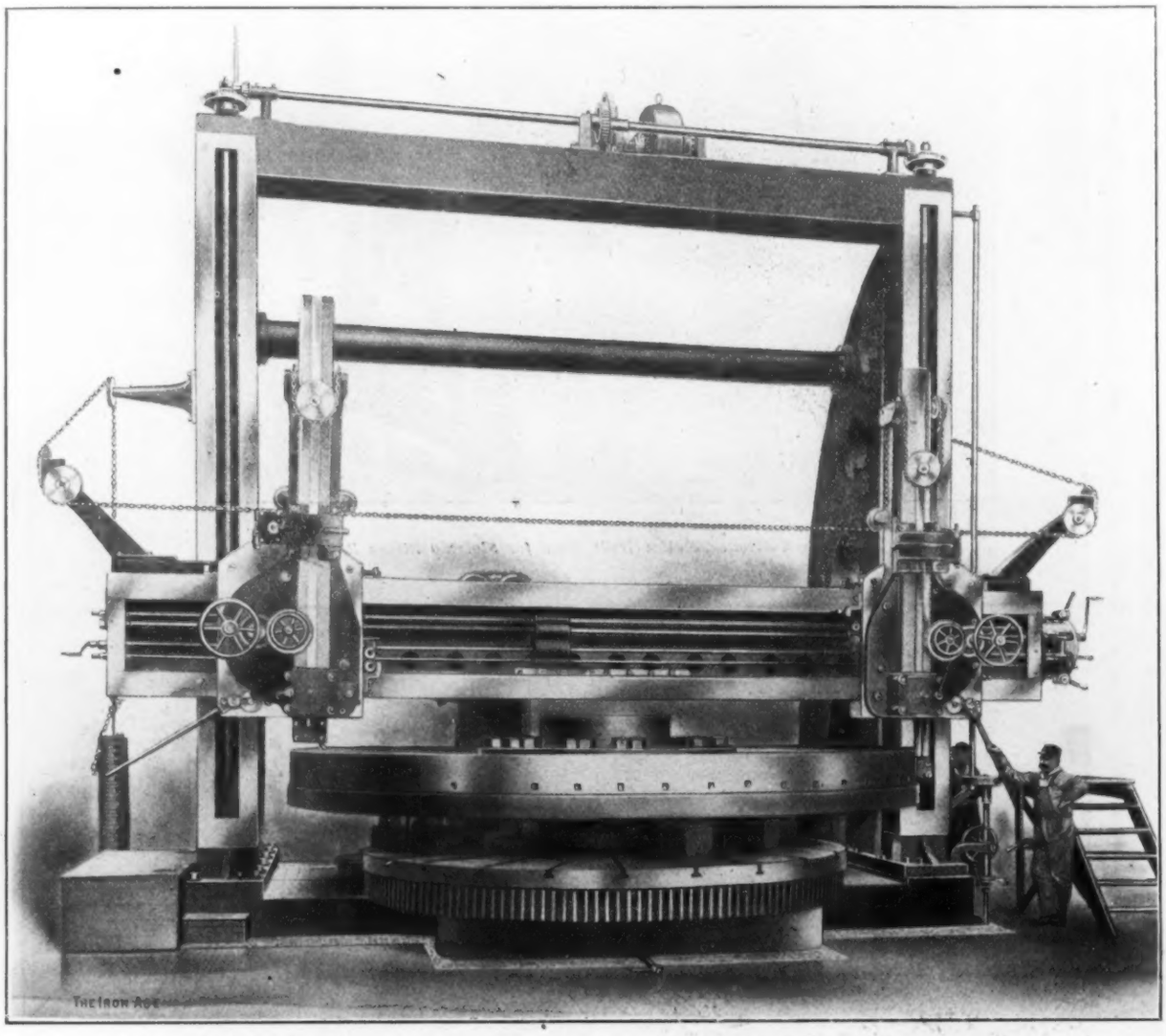

Fig. 10.—Twenty-Foot Boring and Turning Mill.—Front View, Showing Machine at Work on a Large Fly Wheel.

MODERNIZATION IN ENGINE BUILDING.

lined with copper, which is expanded into place and burnished. The pump is double acting, and is controlled or stopped by trip valves without shifting the belt. The ram is counterweighted and returns automatically when the release valve is opened. The safety valve can be set to open at a desired pressure and then locked up in a box cast on the cylinder. The pressure gauge is graduated for tons pressure on the ram and pounds per square inch of its area. To take the discharge and supply the pumps, a water tank is bolted underneath the cylinder. The sliding head is supported by rollers running on planed ways on the base, and is held in position by steel keys. The distance between the tie bars is 10 feet. From the ram to the sliding head the distance is 26 feet. The ram has 48-inch stroke, and is of 14 inches diameter. The opening in the head provides for 30-inch shafts.

A 20-foot boring and turning mill, which is illustrated in Figs. 10 and 11, furnishes an excellent example of the massiveness and enormous power of all of the heavy tools used in the shops. The size of the machine can be better realized in this case, as in Fig. 10 the man shown at the side of the machine seems diminutive in comparison to the gigantic structure which he manipulates.

This machine is of the heaviest type, and is specially arranged for heavy work on fly wheels, rope sheaves, &c. For this purpose it is provided with two heads on the cross rail, and a third head sliding on a column placed in the rear of the machine and adjustable in and out, so as to be able to turn diameters from 20 feet down to 14 feet, or even less, without overhang of tool.

The rear tool is arranged mainly for crowning pulleys, and with this end in view was arranged with a taper turning attachment, which, however, leaves the tool slide entirely free, so that the taper once set, the operator is able to adjust the tool in and out for his roughing and finishing cut or for resetting the tool without loosening any clamps or disturbing his taper attachment. Besides this feature, the mill is provided with a tool slide arranged for facing the inside of the rims of fly wheels. This tool has an adjustment in and out of 30 inches. It can be blocked up at any convenient position near the mill, or it can be fastened to the rear tool slide, in which case it can be used for turning crowned pulleys of a diameter less than 14 feet. The rear tool slide is provided with an up and down feed, a hand feed and a quick hand adjustment, and also an in and out adjustment of 7 inches for the end of the tool slide. It will turn a taper up to 3 degrees in either direction. The hand cutting tool is in the form of a boring mill bar, and when attached to the rear tool column has power feed in and out over its entire length. The amount of feed of the taper tool slide for hand cutting is entirely independent of the feeds of the main boring heads, both in amount and in direction.

The main boring heads have all the arrangements necessary for easy handling of such large and heavy parts. The counterweight chain is brought back so as to allow

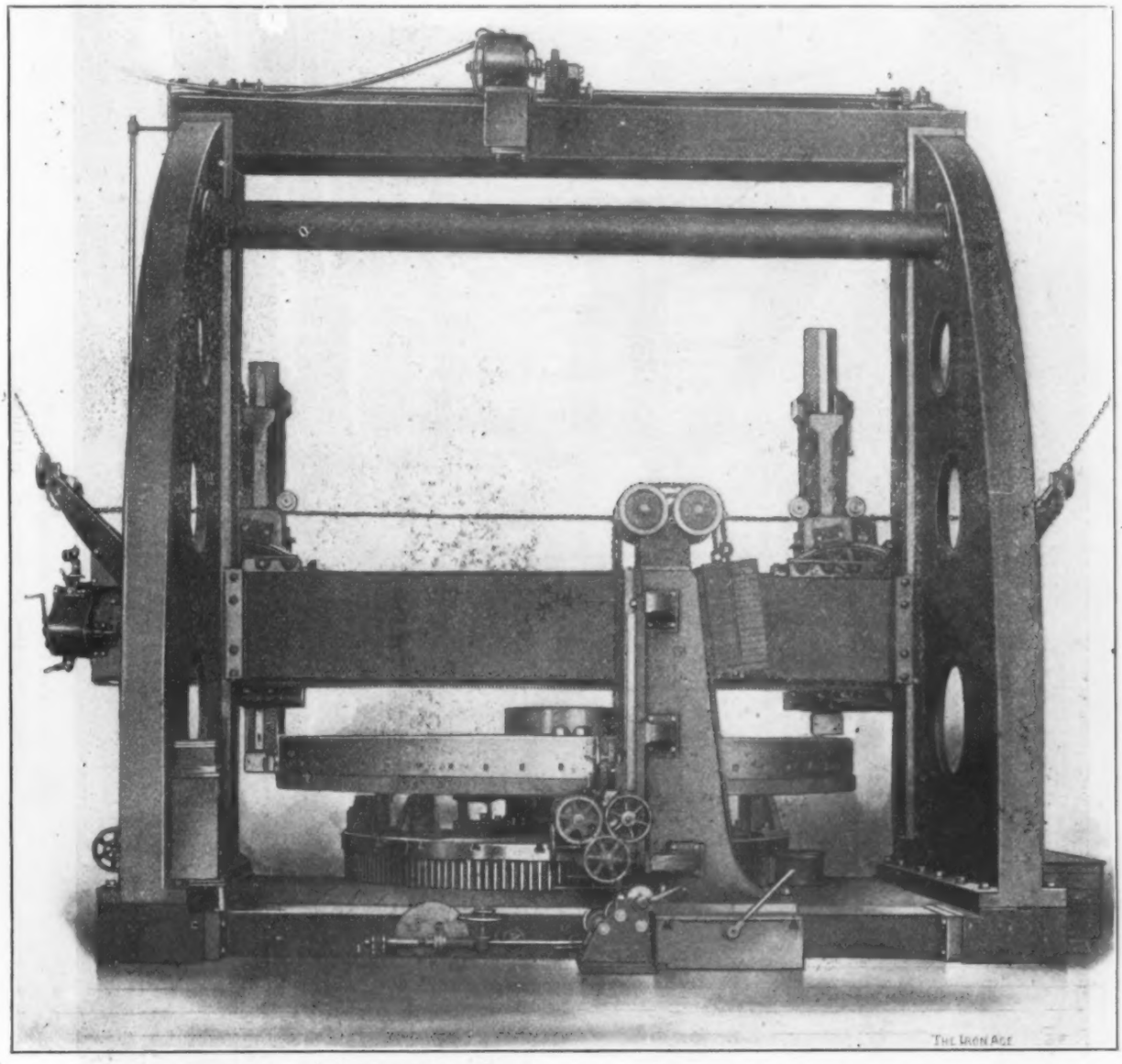

Fig. 11.—Twenty-Foot Boring and Turning Mill.—Rear View, Showing the Rear Tool Column Turning Lower Side of the Fly Wheel Rim.

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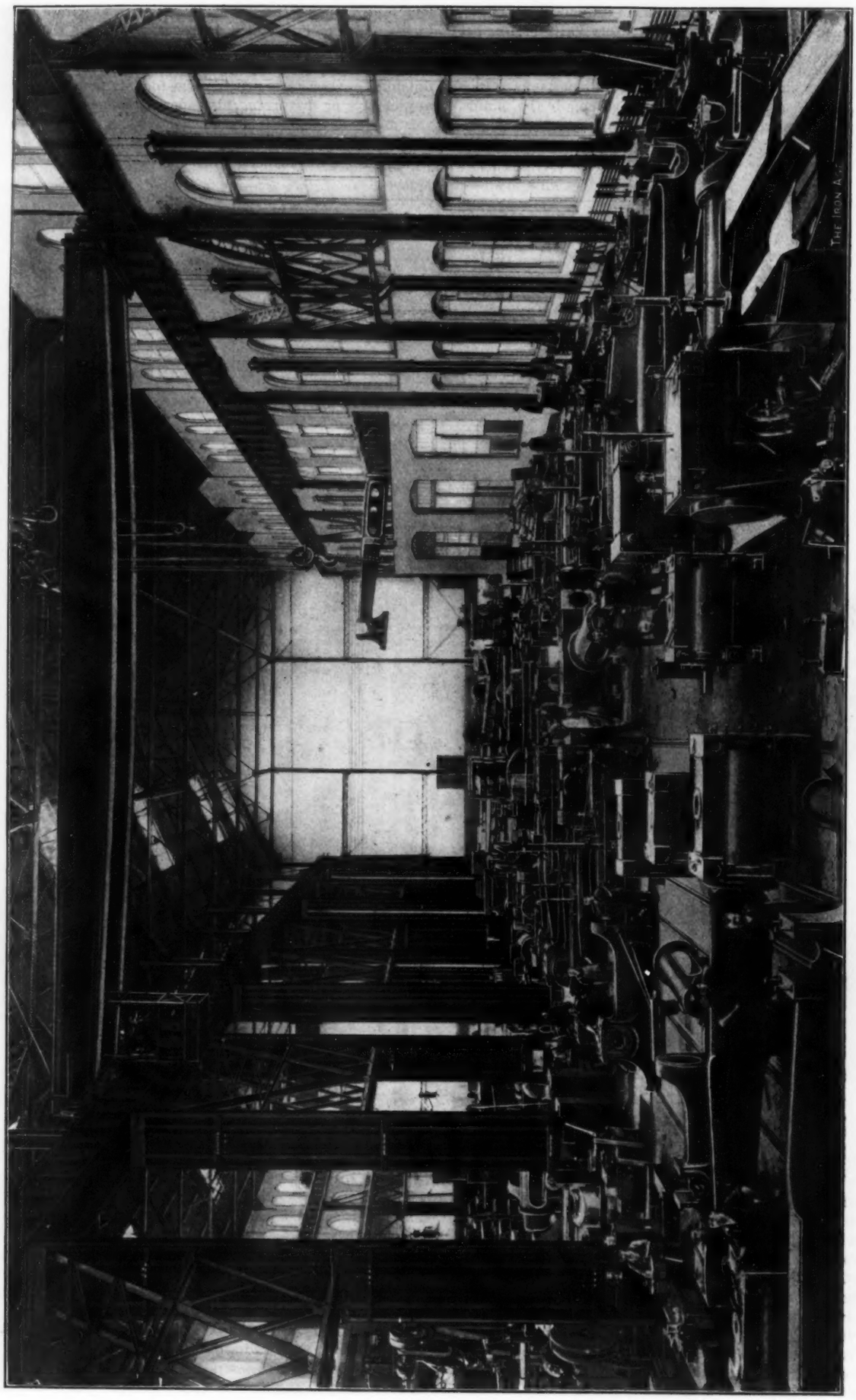

Fig. 12.—*The Erecting Floor.*
MODERNIZATION IN ENGINE BUILDING.

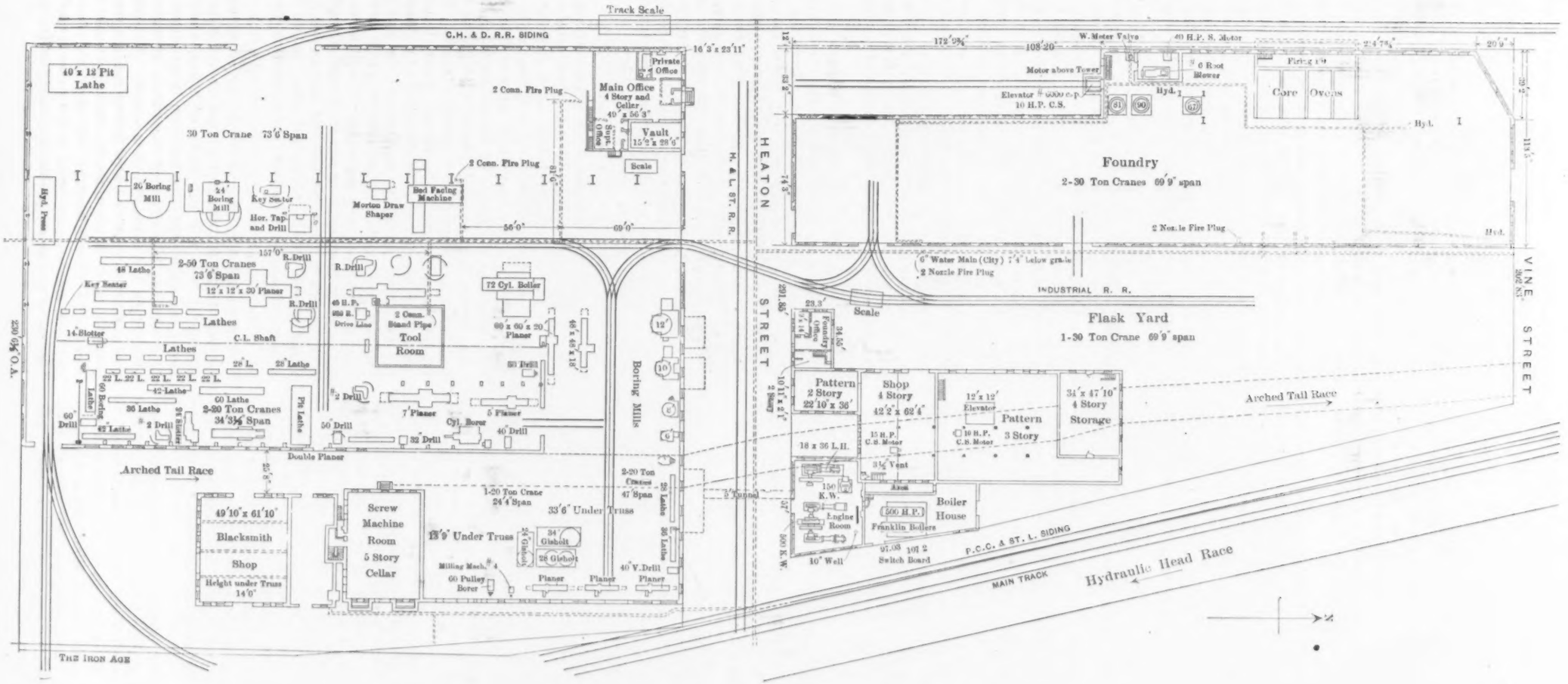

Fig. 13.—Ground Plan of the Plant, Showing Also the Principal Equipment of the Various Buildings.

MODERNIZATION IN ENGINE BUILDING.

the placing of a piece of work on the center table without having the crane chain interfere with the chain of the counterweight.

The feeds of the main heads and bars are operated by means of friction.

The screws and rods are engaged and disengaged, or reversed in direction, by levers at the end of the cross rail, each lever indicating by the direction of its movement in which direction the feed is to go. Thus if the bar should feed upward the corresponding lever has to be thrown upward. If the saddle has to feed toward the center of the mill the corresponding lever must be thrown to the center of the mill, &c.

Ratchets are provided at each head so as to allow the operator to control the feed motions of the head by hand without going to the end of the cross rail. The ratchets are further arranged that no harm can occur should the operator forget to lift the ratchet off the head before starting the power feed.

The elevating of the cross rail is by power, and is accomplished by means of a 7½ horse-power motor, shunt wound, constant speed.

The drive is by means of a 20 horse-power motor, operated on multivoltage plan, with voltages of 60, 80, 110, 140, 190 and 250.

As shown in the illustrations, the housings are reinforced, in the first place, by a peculiar construction of tie bar, which, in this case, is not only bolted between the housings, but also rests on the housings, and by a pipe brace lower down between the housings, though not to interfere with the capacity of the mill.

The elevating screws are supported on ball bearings.

All parts are made especially strong for the heaviest class of work that can be done on this machine.

The principal dimensions are as follows:

Main Machine: Hight under tools, 15 feet; travel of bars, 6 feet; face of rail, 42 inches; face of housings, 20 inches; diameter of table, 14 feet; spindle bearing, 26 inches; diameter of main shaft, 7 inches; external gear, number of teeth, 164; pinion, number of teeth, 15; pitch, 1 diameter.

Rear Tool Column: Face of column, 28 inches; hight of tool above table, 5 feet; in and out adjustment of crowning tool, 7 inches; in and out adjustment of underfacing tool, 30 inches.

For turning fly wheels beyond the capacity of this machine there is a large pit lathe which will take work up to 34 feet diameter and 100 inches face. This machine is provided with special arrangements so that with slight alterations it will be capable of performing still larger work.

An idea of the size of the main shop building may be obtained from Fig. 12, which illustrates one end of the erecting floor or one-half on one of the side bays. It will be observed that the floor has steel slots imbedded in concrete, which furnish a perfectly level surface for assembling the engines.

The general lay out of the entire plant is shown in Fig. 13. One of the most important features in this connection is the arrangement of the various machines, which was done with a view of entailing the least possible moving of the heavy work. Harmonious with this idea is the crane and railway system, or method of handling the work. This is so arranged as to reduce the labor item of expense to the minimum. The smaller working parts of the engines are made in large numbers and the engines are built on the duplicate part system throughout. When the three principal or heavy parts of the engine, the cylinder, guide barrel and bed, are finished they are picked up by overhead traveling crane and placed on the erecting floor. The process of erection is commenced immediately and the numerous auxiliary parts are brought to the erecting room and the engine is properly assembled.

The tool room, it will be seen, is located in the center of the shop. The single check system is in use and the entire shop is thoroughly covered by an extensive electric call bell system, to which the tool room boys answer. There is also an elaborate intercommunicating telephone system, whereby the superintendent can always keep in touch with his lieutenants throughout the plant. The superintendent's office is situated at a point in the northeast corner of the machine shop, commanding an excellent view of the entire shop. In order to enhance the point of vantage the floor of the office is elevated about 5 feet above the shop floor.

The northeast corner of the main building, it will be noted, is occupied by the general offices of the company, as well as the superintendent's office. The upper stories of this section are devoted to drafting departments. The telephone system previously alluded to connects the general and private offices, the superintendent's office, the foremen's desks throughout the machine shop, foundry, pattern shop, blacksmith shop and various departments; the tool room, engine room and drawing rooms.

The various cranes, together with their capacities, are denoted in Fig. 13. There are eight of these employed in the machine shop alone, their capacities ranging from 10 up to 50 tons each. These are so situated as to command every portion of the shop. An industrial railway system is in use in connecting the various departments of the plant and terminating at the shipping department, at the extreme southerly end of the plant.

The shop is well located as to railway facilities, the Cincinnati, Hamilton & Dayton system having a siding along the westerly wall of the main shop. On this it will be seen there is a track scale. On the easterly side of the plant is the main line of the P., C., C. & St. L. arm of the Pennsylvania system. The two roads are connected by a standard gauge loop, running inside of the main shop at its southerly end. The southwestern end of this building is the lower end of the erecting shop. It will therefore be seen that excellent facilities are afforded for shipping and loading the cars inside of the plant, with all of the accruing benefits of the crane service.

For delivering the raw materials to the plant, both railway systems run sufficiently close to permit unloading directly into the foundry, blacksmith and machine shop yards.

In connection with the industrial railway system mention might be made of the fact that the tracks are so laid as to permit the hauling of castings from the foundry to any point of the shop, where they can be taken up and delivered to their destination by one crane, transferring from one traveler to another not being necessary.

An interesting point of construction is a 5-foot tunnel which connects the power station with the main shop, running underneath a street dividing these buildings. In this tunnel the steam heating mains, electric conduits and other piping systems are carried, the connections with the street mains also being made at this point.

The Berlin fire department is experimenting with a unique device called a water hat, which consists of the addition to the ordinary helmet of a circular "rose," which sprays water at an angle of 45 degrees in a downward direction. The pipe which leads to this rose is to be attached to the nozzle of an ordinary fire hose, and when in use the fireman is protected so far as his head and face are concerned by a curtain of water. This curtain of water is useful in several ways—it gives him pure air to breathe, even in the midst of a dense smoke, for it acts as a condensing medium and also as a filter; it will keep him cool in a temperature in which he could not live without some such protection; it will serve to keep his clothing from catching fire from sparks; and, should he be caught in a burning building and unable to escape, would prevent his being burned alive, unless the heat were so intense as to consume the connecting hose.

One hundred miles an hour is the speed which the Aurora, Elgin & Chicago Railroad Company have been aiming at in a test run made with a specially geared motor car. Since this line has been in operation its running schedule has attracted the widest attention among electricians and railroad men generally. Scarcely a day passes that the regular trains fail to attain a speed of 60 miles an hour. Many times the cars have been run at a speed of 70 miles an hour, yet this high rate of locomotion has been scarcely noticeable to the patrons of the road, because of the nearly perfect equipment of the line.

Cincinnati Electrically Driven Milling Machine.

What would appear to be a most satisfactory solution of the difficulties attendant upon the successful arrangement of milling machines for driving by direct motor connection is to be found in the newly developed machine very thoroughly illustrated in the several engravings presented herewith. One feature contributing to the complexity of the problem in question is the peculiar service to which milling machines must be adapted. For one thing, wide ranges of speeds with numerous intermediate steps are generally recognized as essential to economical operation. For another thing, the power consumed is such as to require the use of a motor comparatively large in relation to the bulk of the machine to which it is attached. Furthermore, the necessity for frequent stoppage and starting of the machine in actual service must be realized and provided for. These conditions have been recognized by the makers of the machine before us, and the success with which they have met the requirements in the actual design may be judged from the illustrations and from the following description:

The machine shown is a plain miller, designated as No. 4 by the makers. Alterations from previous standard designs affect principally and almost solely the driving arrangements and extend, therefore, scarcely further than the arbor spindle. The complete design, as shown, is put forward with confidence in its efficiency, since it involves no experiments, but is the result of about four years of attention to the problem of electrical driving as applied to machines of this class. It is stated that a number of smaller machines equipped with a similar driving arrangement are already in successful operation both in this country and in Europe. As stated by the makers, the design of this machine is based upon their conclusion that the only satisfactory arrangement of a directly connected electric drive for machine tools is obtained by the use of some type of variable speed motor. In this particular case the builders strongly advocate the use of the shunt wound direct current motor controlled by means of a field rheostat. Variation of speed in the motor itself is held to obviate the use of a considerable mass of gearing, an advantage to which is added the further desirable feature that the field rheostat, when once set to give the desired speed for any particular job, need not be disturbed when stopping or restarting either the machine or the motor. By this latter arrangement there is eliminated the trouble frequently arising from setting the controlling lever

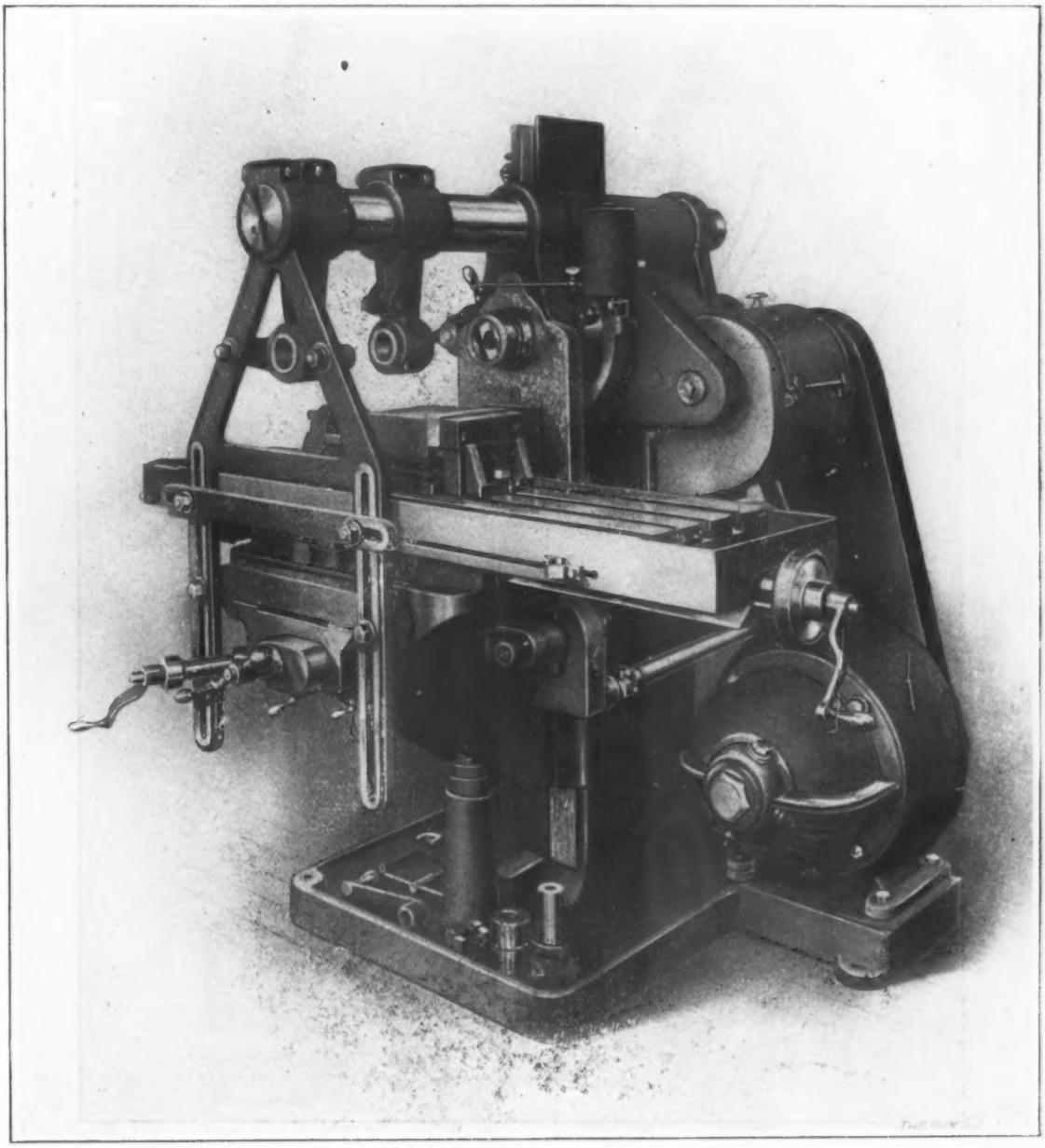

Fig. 1.—Plain Miller with Direct Connected Motor Drive through Friction Clutch.

CINCINNATI ELECTRICALLY DRIVEN MILLING MACHINE.

to the wrong notch, as so often happens when the street car type of controller is used.

In Fig. 1 is fairly shown the manner in which the motor is mounted upon an extension cast in one piece with the base of the machine. This location of the motor brings it close to the floor, adding to the general stability of the machine. Furthermore, the motor and its connecting gearing occupy a place at the rear corresponding to that which must be provided to accommodate the table travel. Such being the case, no valuable space need be devoted to the placing of the motor, inasmuch as the space used would not be available for other purposes. The one

voltages would be used, thereby simplifying the wiring of the controlling apparatus.

Fig. 2 gives a front view of the machine, showing the placing of the rheostat and the location of the controlling levers for back gearing. This gearing is all inclosed in Fig. 2, but is shown uncovered in Fig. 3, which view is from a position quite similar to that of Fig. 2, but showing the driving mechanism more in detail. In Fig. 3 a different rheostat than that of Fig. 2 is shown, and mounted beside the rheostat is the main switch for controlling the current received from the power mains.

Fig. 4 reproduces a drawing showing a horizontal sec-

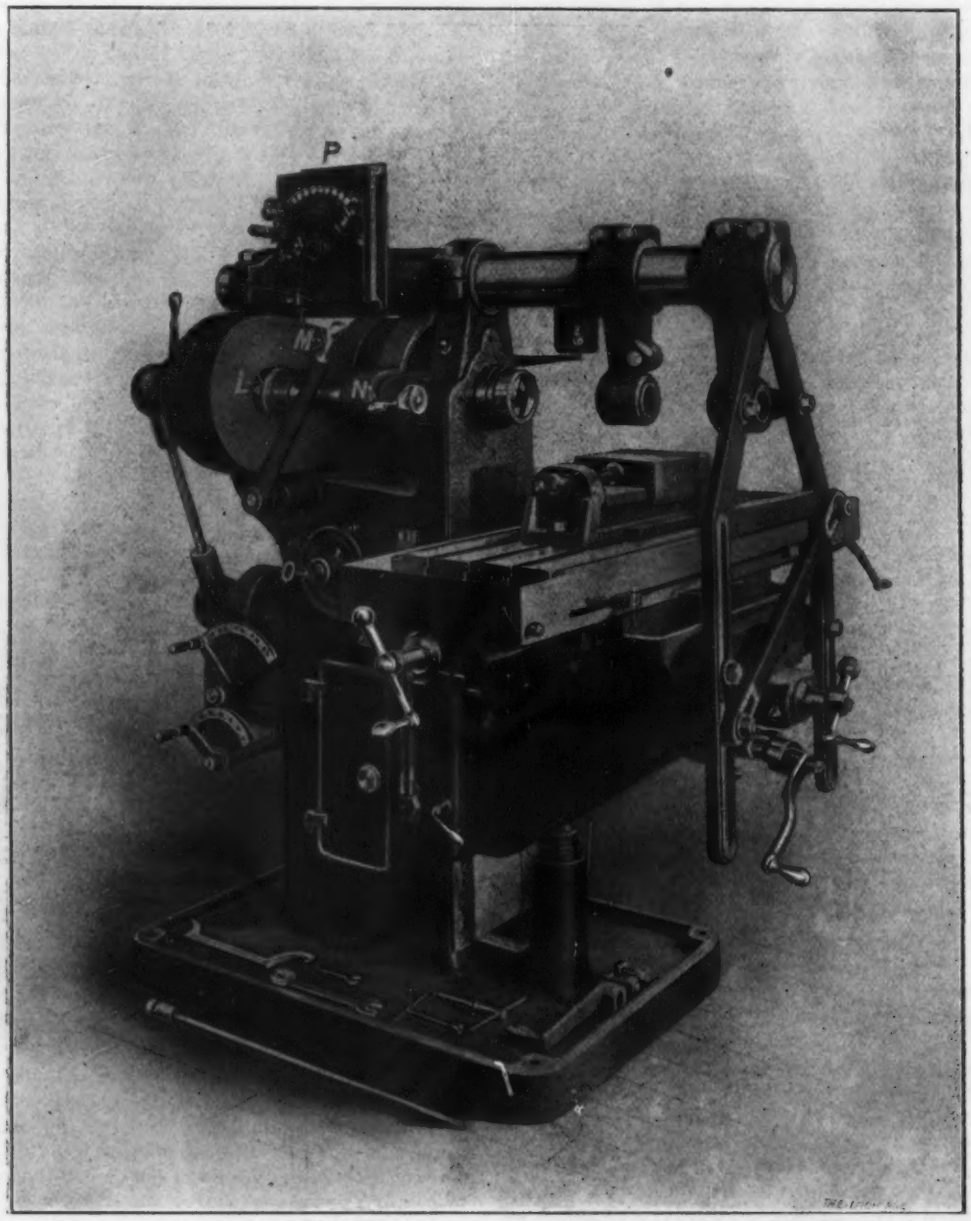

Fig. 2.—Front View of the Machine, Showing Arrangement of Controlling Levers, Handles, &c.

CINCINNATI ELECTRICALLY DRIVEN MILLING MACHINE.

requirement limiting the type or make of motor which may be used is that it should be shunt wound for speed variation through the range corresponding to a ratio of 2½ to 1. The motor speeds are multiplied by the double back gearing, so as to give at the spindle a range of speeds suitable for cutters of diameters from 5-16 to 6 inches with surface cutting speeds of 20 feet per minute, and for cutters of from ⅝ to 12 inches in diameter at a surface speed of 40 feet per minute, suitable for cast iron. It is urged that these machines fitted with shunt wound motors are thoroughly adapted to the requirements of shops using the multiple voltage system, in which shops, however, only one of the several available

tion through the center lines of the clutch shaft, the spindle and the back gearing, thus presenting a sectional plan view of the mechanism, from which its construction and operation may be clearly understood. Power from the motor is delivered by a silent chain to the sprocket gear A, Fig. 4. This gearing is carried upon a sleeve passing through a suitable bearing, and is connected at its right hand end with a friction clutch, whose operation is controlled by the lever shown at the bottom of Fig. 4 and in the foreground of Fig. 3. In Fig. 2 this lever is indicated by the letter M. This clutch shaft is, in turn, connected by Morse silent chain to the main spindle sleeve K, Fig. 4. This spindle sleeve K then may be

driven at any speed corresponding to the range of variation provided for by the rheostat controlling the motor. The driving of this spindle sleeve through the friction clutch is one of the novel features of the design of the machine, providing as it does for stopping and starting quickly and as often as may be desired without stopping the motor. This provision enables the saving of a considerable amount of time which would otherwise be lost in waiting for the motor to come to a full stop and in again attaining full speed from rest. The cost of current consumed in running the motor idle while the clutch is disengaged may readily be understood to amount to little in comparison to the value of time saved in the operations of stopping and starting. For longer stoppages of the machine the motor may also be stopped and the consumption of power avoided.

The arrangement of the double back gearing is plainly shown in Fig. 3, and the construction may readily be understood by reference to Fig. 4. In the latter engraving the first back gears are shown in mesh; the second back gear pair consists of the gears G and H. Gears F and H are both keyed to a sleeve sliding upon the back gear quill J, and driven from it by a feather key. Gear H is provided with a flange, as shown in both Figs. 3 and 4, so as to prevent the possibility of its sliding into interference with the gear G when the first back gearing is in use. When it is desired to use the second back gears, the back gear lever N, Fig. 2, is first used to throw the

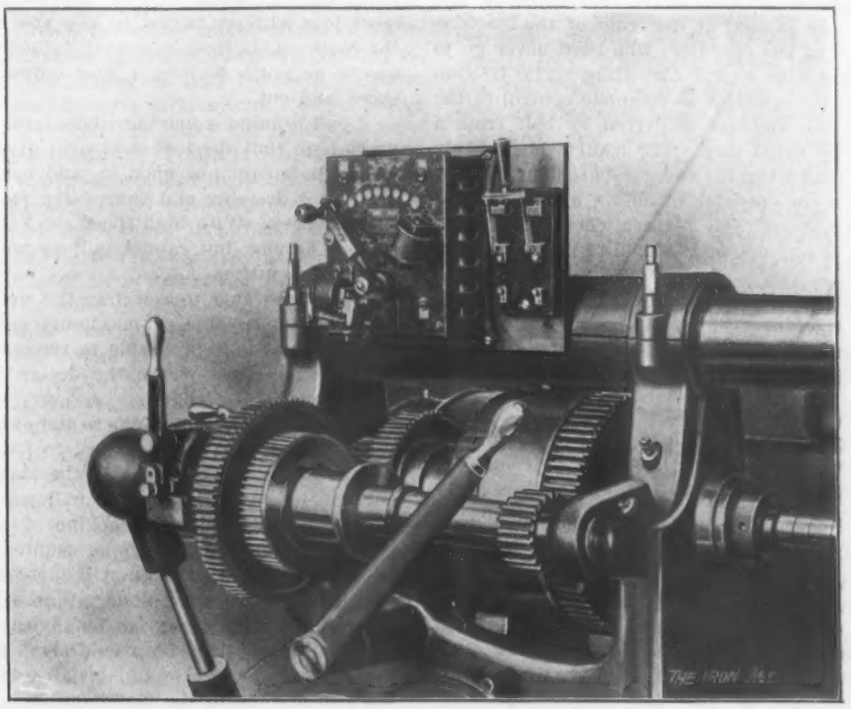

Fig. 3.—Back Gearing with Casings Removed.

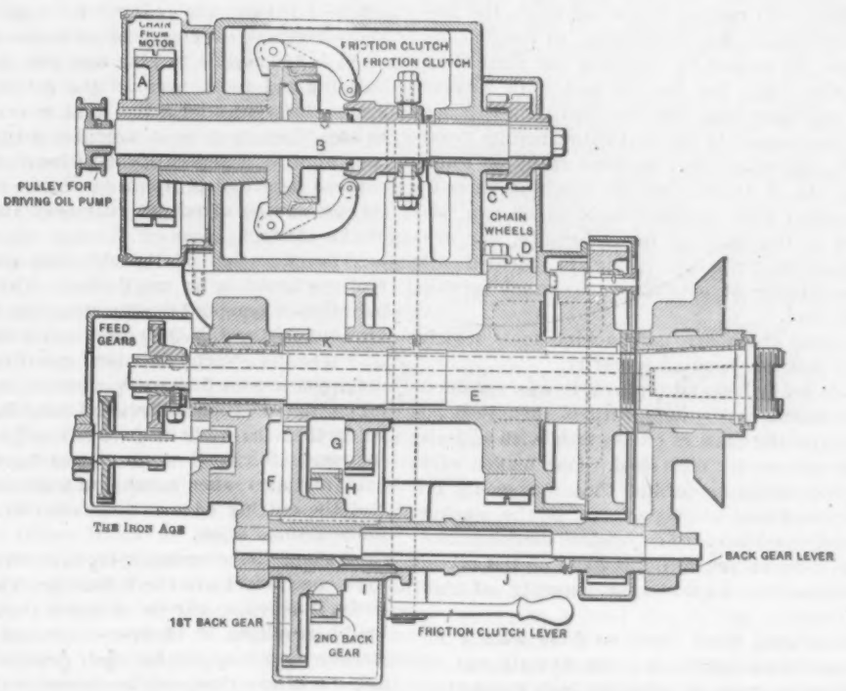

Fig. 4.—Plan Section through Driving Mechanism.

CINCINNATI ELECTRICALLY DRIVEN MILLING MACHINE.

back gearing all out of mesh in the usual way; then, by means of the flange L, Fig. 2, on the end of the double back gear sleeve protruding from the gear casing, gears G and H may be brought into engagement, and the first back gear pair thrown out of mesh at the same time.

By reference to Fig. 2 it may be seen that the automatic release starting box and field rheostat P, the friction clutch lever M, the back gear lever N and the double back gear shaft L, as well as all feed changing and adjusting levers, are located at the front of the machine within easy reach of the operator, who need never go to the rear of the machine except for oiling. The friction clutch lever gives the operator as complete control of the spindle as when the machine is driven by belt from a countershaft in the usual way. The control is probably more convenient than when the countershaft is used, since the clutch enables the operator to obtain a partial rotation of the spindle, a desirable feature whose advantages will be apparent to any one accustomed to the use of machine tools.

The machine illustrated is built by the Cincinnati (Ohio) Milling Machine Company, who state that they are prepared to supply any of their back geared machines equipped with this arrangement for electrical driving.

Machine Tools and High Speed Steel.*

BY J. A. CARNEY.†

For a great many years tool steel was dependent upon carbon for its hardening qualities, and attained its hardness through a delicate heat treatment and sudden cooling, requiring great precision, and tool dressing was looked upon as the pinnacle of the blacksmith's art. Great care had to be exercised in its use to prevent overheating and drawing the temper from the cutting edge.

Since the discovery of the self hardening steel, which contains some carbon, and the high speed steel, which contains no carbon, and requires to be run at a high temperature for best results, and will do an amount of work impossible with carbon tempering steel, the machine shop superintendent has undertaken to tone up his shop and increase the output by speeding the machinery and taking heavier cuts; but he has met with serious obstacles in the machines from the fact that they will not stand the strain necessary to get maximum results from high speed steel, and either the machine stalls or some part gives way. It is a fact that no machine shop is to-day fully equipped with machine tools which can use high speed steel to the limit of its endurance, nor are machine tool makers prepared to-day to furnish all classes of tools capable of obtaining maximum service from high speed steel.

It is not claimed there are no machine tools which will do this, but they are a small minority.

In getting bids on lathes and planers, it was specified that the lathes should cut ½ inch with ⅛ inch feed 30 feet per minute, and the planers cut ⅝ inch with ½ inch feed 30 feet per minute in mild steel. One maker said there were no such tools made, but that they could be made at an increased cost of 50 per cent. of the market price of standard machines. And to-day machine tool makers are only commencing to build tools of the necessary weight and strength to get the full capacity of high speed steel.

The question arises, What shall be done with a lot of serviceable machines which are not exactly out of date, but which cannot keep up with the high speed steel pace? In a great many cases they can be speeded up and with moderate cuts the output of the tool largely increased, but it is found that the belting commences to give out and cast iron gears break. It is possible to replace cast iron gears with steel, but it is very probable that some other part will be unable to stand the strain, and the machine will be wrecked.

The effect of belting with increased speed and cut on old tools is most disastrous, and if a tool is worked to its capacity the cost of repairs to belts and purchase of new ones will increase as much as 100 per cent. The belts, if single ply, can be replaced with light double ply at a slightly increased cost and an increased service greater in proportion, and in some cases it may be found economical to equip the machines with new cones, taking a wider belt.

The possible time saving of high speed steel, used with old and weak machines, is due to the fact that it will do much heavier work without regrinding and will finish most jobs without having to stop the machine and grind the tools. This item is a most valuable one and will do nearly as much to help a good output as the increased speed and cut.

I call to mind a driving wheel lathe that was speeded up so high that the tool steel used at the time would not stand the strain put upon it, and nearly as much time was spent dressing and sharpening tools as was used in turning tires. With high speed steel this lathe is in continuous service, but cannot pull as much as the steel is capable of cutting.

Is it profitable to continue the use of tools for general use not capable of maximum output as calculated to-day? And is it profitable to reconstruct such tools to give greater speed where the design does not allow of much increased strength?

In reply to the first: Where the output of a tool is in such demand that it is worked to its limit of capacity, and to increase the output of the shop would mean the purchase of a similar tool, it will pay to get rid of the original tool and buy a machine of up to date design, capable of maximum effort as counted to-day. The single tool of modern design will more than make up its cost in the extra work done. Where a tool is not kept busy all the time it may not be advisable to spend money where increased capacity would mean increased idleness; but even then there would be an argument of cheaper work on account of the faster output.

In reply to the second question: Increased speed can be obtained in most cases by increasing the speed of the countershaft, but great care must be taken not to tax the old tool beyond its endurance, or a series of annoying and sometimes expensive breakdowns will result.

It is impossible to give any rule for scrapping or rebuilding old tools, because the conditions of each shop are so different, and a tool that is very nearly worthless in one shop may be a valuable adjunct to some other shop; but as a general proposition it is advisable to purchase a new tool if it can be shown that 20 per cent. of its cost can be saved per year over and above the output of the old tool.

The education of the old time slow speed tempered tool machinist is no small item. This can only be done by intimate personal supervision, and it takes time to get him out of the 1-32-inch feed and 1-16-inch cut rut.

Up to the present time high speed steels have not given much success in fine work where a heavy cut cannot be taken, nor do they make good finishing tools, the reason being that the high temperature of the point of the tool necessary for good work cannot be maintained on fine cuts, and also when maximum work is being done by the tool the cutting edge is somewhat blunted and does not make a smooth job.

Among the economies brought out by the advent of high speed steel are the following: Forgings do not have to be finished so closely to make them work up economically, resulting in cheapened cost of blacksmith work; harder cast iron can be used, resulting in greater wearing qualities; tires can be turned with a minimum loss on account of being able to cut closer under the skin.

The output of the shop equipped with old tools can be increased to a considerable extent by speeding up the machinery; but the makers of machine tools have had to wake up to the fact that heavier and more powerful machines must be made to keep up with the working capacity of high speed steel, and I venture to prophesy that heavy machinery is as yet in its infancy.

* Paper read and discussed at the December, 1903, meeting of Western Railway Club.

† Master Mechanic, Chicago, Burlington & Quincy Railway.

At the Copper Miners' Tin Plate Company, Limited, of Crown Avon, South Wales, a Pelton wheel has been put in to drive a 19-inch tin bar mill.

The Coal Trade in 1903.

BY FREDERICK E. SAWARD, NEW YORK.

The year 1903 has been one of the most peculiar years in the history of the coal trade, in that there has been a most extraordinary range of prices, and at the same time the largest production on record. In the first quarter of the year there was a tremendous demand for fuel of all grades, and the hard coal producers could not begin to fill the requirements for any grade—steam or otherwise—so that all manner of makeshifts were resorted to. Bituminous coal was imported into the New England States to the extent of over a million tons, and yet prices were up to $5 per ton at the mines for American bituminous coal. This condition of affairs lasted until the opening of the summer season, and then there came some relief to an otherwise very irksome situation, and prices gradually droppped away, until less than $1.25, at the mines, was a figure which was heard of during the month of November. It must be of the greatest general interest to know that in spite of the dullness of the general trade situation in the last quarter of the year, the total output will be larger than ever before, in all grades of fuel.

Unquestionably the year was a good one for all that part of the fuel industry connected with anthracite; the tonnage exceeds all records, and the mine workers and owners have been working under pressure all the time. There were nine months when the tonnage was over the 5,000,000-ton mark, and many new monthly tonnage records were made. The employees have been the gainers by increased wages and more steady work. How much the output can be increased next year is a question, but this country seldom goes backward, and there ought to be some good times ahead for this industry; the main thing is peace and harmony, so far as possible, in the mining districts. There are some people who are of the opinion that the steam sizes of anthracite might be sold on a sliding scale, like the domestic sizes; this would reduce the stocking thereof in the summer season to a minimum and hold the trade which this interest now enjoys in a more substantial fashion. The fact that the steam sizes of anthracite—taking in pea coal—represent more than 40 per cent. of the total shipments, is a feature not to be overlooked. It will be remembered that in the fall months it was necessary to discount the price-list on the steam sizes, in order to move them away from the stocking grounds. The anthracite tonnage account of shipments for November showed a total of something over 4,000,000 tons, despite the several holidays in that month, and the total of 11 months was 55,100,000 tons shipped, which is more than in any previous year. It is evident that the shipments for 1903 will foot up nearly 60,000,000 gross tons. Prices have averaged about 50 cents a ton more this year, but the increased cost of mining may reduce the apparent profit somewhat. It must be remembered that the wages are now based on a sliding scale of prices, and if the market price is advanced from any reason whatever the laborer in the mine gets a corresponding benefit therefrom. Knowing this, one need not be surprised at the constant petty troubles at the mines—fully as many as heretofore—which keep the market from going "off" in the way of values. No one need look for the accumulation of any great surplus of anthracite for this very potent reason. Perhaps some day there will be a greater use of mechanical contrivances that may tend to give us more tonnage, but while we are dependent so much on labor to do as it pleases there is not any likelihood of there being cheap coal.

About 20 years ago Henry M. Chance, then connected with the Pennsylvania Geological Survey, was of the opinion that our output of bituminous coal might by 1910 reach the total of 200,000,000 tons; that Pennsylvania might get up to 70,000,000 tons, though he feared the growth in West Virginia would cut this to about 58,000,000 tons. The fact is that in 1902 Pennsylvania had grown to 98,000,000 tons, while West Virginia had increased to 25,500,000 tons in the same period, and that the country's output rose to 254,000,000 tons. It is an interesting fact in connection with the bituminous coal trade of this country that it is fast getting into fewer hands; that 25 concerns last year produced nearly one-half of the tonnage, headed by such concerns as the Pittsburgh Coal Company and the United States Steel Corporation, and both of these concerns have millions of tons of coal yet untouched that will come into play when the necessity occurs for the exploitation of their property. The large development of coal of the bituminous variety during the past year, continued after the effect of the short supply of hard coal in the spring, put an enormous quantity on the market, and some of it was of poor quality. The better grades must win out in the end, and there could be a schedule based on quality, if there were any degree of business harmony or good sense among the producers. With the trials and tribulations of consumers this season who have suffered severely from poor coal in their furnaces, and from fires due to premature combustion, there is a better prospect of such a schedule than ever before. The interior trade is, as a rule, far more discriminating in this regard than the eastern portion of our country, where soft coal is so largely used for manufacturing steam purposes, as in the New England States. Prices, which earlier in the year were put at $3.15 for the best grades, on board at Hampton Roads ports, were at the end of the year cut to $3.60 per ton at Boston alongside, which shows the change in values more than many columns of statistics. A feature of interest in connection with the New England trade is the increased all rail haulage, as against water transportation. It is growing all the time, and the price delivered at interior towns is something higher than the former cost, where it had to be rehandled, but the coal is in better shape.

The report of the Geological Survey showed that 254,738,804 net tons of bituminous coal were produced in the year 1902, and this amount will be increased for the current year, as there has been a great development in the Southern and in the Western States, while Pennsylvania will not fall much behind its record. This large development, however, leads to the suggestion that the foreign trade must be looked after. Even at the present time there has been tonnage sent abroad, and the Alabama mines are now furnishing coal to the Mexican Central Railroad, through the port of Tampico, and shipping coal also to Vera Cruz, to Port Limon, to Cuban ports, to Jamaica, and a little to the Isthmus. The coal gives perfect satisfaction, the business is remunerative, and the trade of the entire territory fronting on the Gulf of Mexico and of the West Indies lies ready at hand, whenever developments adequate to supply it are made. In addition to this may be noted the business in West Virginia coal, through Baltimore and Hampton Roads.

The total output of the bituminous tonnage in this country may be put at the following in the years named, and the growth is shown thereby:

	Tons.		Tons.
1873	27,000,000	1893	130,000,000
1883	57,000,000	1903	280,000,000

Surely this is a startling statement and is one that is not considered by the average investigator of trade facts. The growth would have been much retarded but for the use of machinery in and about the mines, electrical and otherwise, for with an increased tonnage manual labor would have been inadequate, even at much increased wages. One cannot but look forward to an even more extended use of machinery, and this will keep prices at a level fair to the producer as well as to the consumer. The latter must have fuel at a fair price in order to promote the further development of the industries of our country. We cannot find any cause for alarm at the average prices which rule at the present time, of, say, $1.75 per ton at the mines for shipments east of the Alleghanies.

In the hard coal the yearly tonnage has made no such growth in the period named as has bituminous coal, for it is so largely a domestic fuel. The figures follow:

	Tons.		Tons.
1873	21,000,000	1893	43,000,000
1883	31,800,000	1903	59,600,000

Prices on this variety of fuel are now pretty firmly fixed, and there is an earnest endeavor to get a profit on the product, which is a very different state of affairs as against the years prior to 1900. The producers are not

inclined to do anything along this line, however, which will tend to any lessening of the demand. They will make more profit from a larger movement, steadily developed, than by any erratic change in prices or in tonnage; the result of the sliding scale of prices during the active shipping season has been productive of more evenness to the output, a feature much to be desired.

Much interest is already being taken in the joint conference at Indianapolis, scheduled for next month, of operators and employees; there have been meetings of operators held in various sections of the States interested to discuss the situation, while the miners have been busy electing delegates. It will no doubt be one of the most important joint conferences ever held by representatives of this most important industry. The districts affected, Western Pennsylvania, Ohio, Indiana and Illinois, together turn out a tremendous tonnage, and a great deal of it is competitive. Still, coal of West Virginia and other States must be considered.

Recent scientific investigations show that there is an actual increase in the average life of the people, the gain being something over seven years in a period of 75. The reasons assigned are: More natural ways of living, through better knowledge of sanitary and hygienic laws, and a larger amount of out of door life.

The Barnes Positive Self Feed Upright Drill.

What is believed by the makers to be an improvement in upright drilling machines has recently been placed upon the market. In its design have been included various radical changes from standard practice, such as to make a description of the machine of particular interest. One of the drillers, in whose construction the new devices have been included is shown in Fig. 1, while the mechanism of the positive self feeding device is illustrated in Fig. 2. The greater portion of the feeding mechanism, Fig. 2, is inclosed by suitable protecting casing in the actual machine, as shown in Fig. 1. On the larger tools of the new type this mechanism is arranged to give eight different feeds, as in the case here illustrated. In the smaller machines the spur gearing, shown in Fig. 2, is single, instead of double, thus pro-

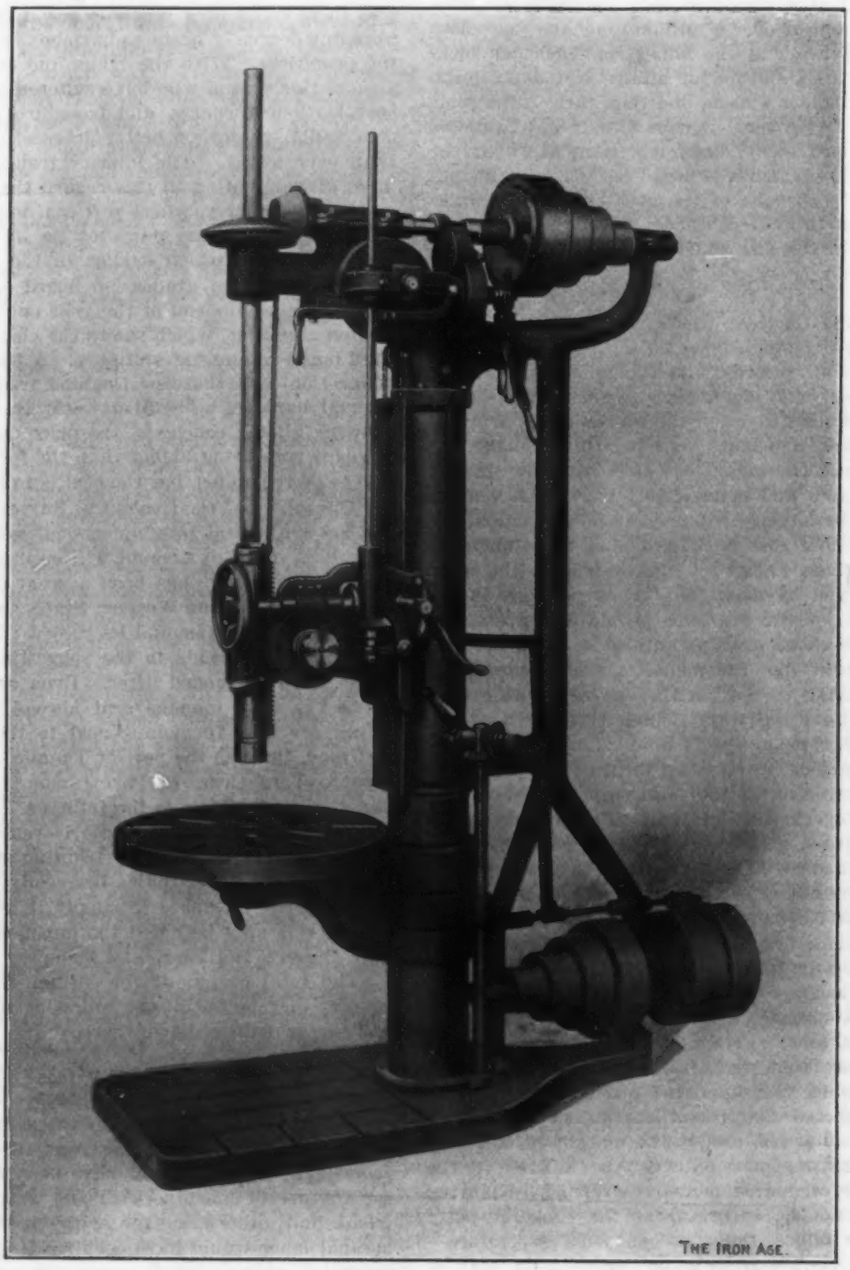

Fig. 1.—The Positive Feed as Fitted to the Machine.

THE BARNES POSITIVE SELF FEED UPRIGHT DRILL.

viding for only four speed changes. These various feeds are designed to include a full range, from the rate adapted to reamer work or for drilling in steel to that of suitable coarseness for boring in cast iron.

The mechanism for obtaining the several feeds may be understood by reference to Fig. 2. The pinion shown at the upper right hand corner is mounted directly upon the main horizontal spindle of the machine, shown in Fig. 1. One or the other of the two pairs of compound gears below this pinion may be brought into operation by manipulation of the hand lever at the lower right hand corner of the illustration, thus providing for two speeds of the horizontal feed shaft. For each of these two speeds four speeds of the vertical feed rod are obtained by shifting the feathered spur pinion along the horizontal shaft by means of the handle at the left, so as to bring the pinion into mesh with either of the four circles of teeth upon the face of the feed plate carried by the short shaft drivin the vertical feed rod through spiral gearing. At the under side of the horizontal por-

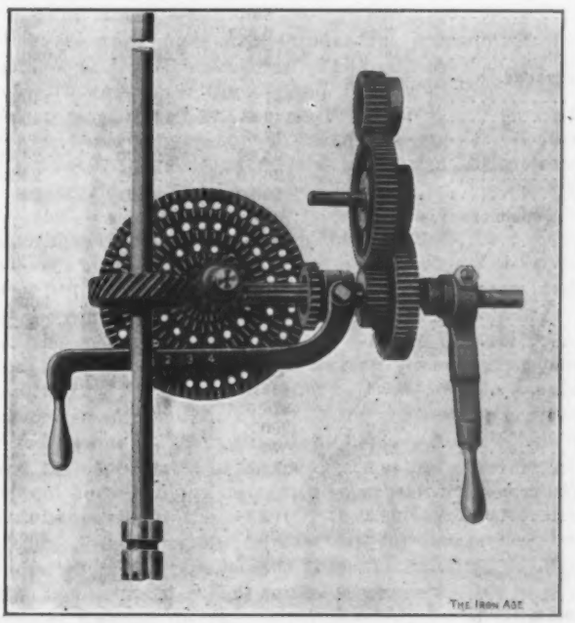

Fig. 2.—Detail of Feed Mechanism.

THE BARNES POSITIVE SELF FEED UPRIGHT DRILL.

tion of the rod shifting this pinion are four numbered notches, each notch corresponding to proper meshing of the pinion with one circle of teeth on the face of the disk. A pin for engaging these notches is suitably located upon the case inclosing the disk.

Conspicuously placed on each machine is a feed index plate, by which the operator may tell at a glance the exact feed for each position of the two levers controlling the adjustment of the feed mechanism. It is claimed that an intelligent use of this positive feed will increase by from 15 to 25 per cent. the output of the drill press. This for two reasons: 1, Because the action is absolutely positive and does away with the effects of slipping belts; 2, because the feed can be changed by a simple movement of one of the two levers while the drill is running, avoiding the delay which would be occasioned by the necessity for stopping the machine for shifting the belts.

Another point to which the makers call attention in regard to the positive feeding of the drill in a tool of this type is that it provides a variety of feeds adapted to the use of the high speed cutting steels that are on the market to-day. They hold that the old style belt driven feed was not only weak, but also failed to give sufficient speed variation. By providing eight positive rates of feed the operator of a machine of the type illustrated is said to be in position to use tools made of either the old slower cutting steels or of the new rapid cutting steels. This matter of adaptability of machine tools to the use of modern rapid cutting steels is one of importance, and that the present machine has been designed with this point in mind is worthy of attention.

It is stated that simplicity has been sought in the general design of the machine, and that the materials and workmanship in its construction are of the very best. It is made in various sizes and styles by the W. F. & John Barnes Company, Rockford, Ill.

Germany's Strides in the Iron Industry.

After a steady increase in the production of pig iron in Germany from 1876 to 1900 the first reaction took place in 1901, the output declining from 8,520,541 metric tons to 7,880,087 tons in 1901. The year 1902 brought a recovery, to 8,402,660, while 1903 will display another record, the indications being that the output for 1903 will exceed 10,000,000 tons of pig iron. During the first ten months of this year the make was 8,394,056 tons, as compared with 6,917,737 tons during the corresponding period of 1902, an increase of 1,476,319 tons, which proves the estimate made for the whole year 1903.

It seems that the production of steel has grown correspondingly, to judge from the output of basic pig, which was 5,158,010 tons during the first ten months of 1903, as compared with 4,276,948 tons in ten months of 1902. This is an increase of 881,061 tons. Since the production of steel was 6,645,869 tons in 1900, 6,394,222 tons in 1901 and 7,780,682 tons in 1902, it is estimated that the steel production of 1903 will exceed 9,000,000 tons.

The very great development of the export trade of Germany accounts for a great share of this increase. During the first nine months of 1903 the total exports of iron and steel inclusive of machinery amounted to 2,856,302 metric tons, as compared with 2,533,783 tons during the corresponding period of 1902.

The Iron and Coal Trades Review, in its issue of November 27, 1903, describes and illustrates fully a Mond gas producer plant, built at the works of Monks, Hall & Co. of Warrington. The gas is used first to heat two Darby heating furnaces and second to drive a 16-inch cogging mill and a 10-inch finishing mill through a 600 horse-power Premier gas engine. Finally, the gas is employed to operate an electric lighting plant through a 200 horse-power Stockport gas engine coupled direct to a Thomson-Houston generator. The gas plant consists of two producers, one of which is in reserve.

A new project is on foot looking to the establishment in the Great Dismal Swamp, south of Norfolk, Va., of a canal capable of accommodating vessels with drafts of not over 9 feet. The present canal, connecting the Chesapeake with Albemarle Sound, has a limit of about 6 feet. The estimated cost of a 9-foot canal is about $1,365,000; of a 10-foot canal, $1,711,000. This canal would enable all vessels whose draft permitted them to take advantage of it to escape the passage of Cape Hatteras, one of the great storm centers of the world. It would also have a very considerable strategic value in time of war, allowing the rapid mobilization of squadrons of torpedo boats and destroyers, and of submarines, while wholly secure from the observation or molestation of the enemy.

In connection with the speed trials of the new British armored cruiser "Drake," in which a speed of 24 knots was obtained while running at full power, experiments were carried out with a new type of propeller, the blades of which are almost circular in shape, instead of the usual approach to the oval form. "By this arrangement the screws obtain a more powerful grip of the water." Owing to the conspicuous success which attended the speed trials of the "Drake," since the maximum speed contracted for was only 23 knots, it is proposed to carry out further tests with this form of propeller on other vessels of the Royal Navy.

Tests of a Compound Engine Using Superheated Steam.*

BY PROF. D. S. JACOBUS.†

The engine on which the tests were made was located at the Millbourne Mills in Philadelphia. It is of the Rice & Sargent horizontal cross compound condensing type, especially designed for using highly superheated steam. A Schmidt superheater is used for superheating the steam. The tests were made to determine whether certain guarantees were fulfilled which were made by the builders—the Providence Engineering Works.

The high pressure cylinder of the engine was furnished with double beat poppet valves and the low pressure cylinder with Corliss valves. The inlet and exhaust valves of each cylinder were operated by separate eccentrics. The inlet valves were closed by vacuum dash pots and the exhaust by a positive motion. A portion of the highly superheated steam furnished to the engine passed through a coil in the receiver between the high and the low pressure cylinders. There was a by-pass valve operated by the governor which regulated the amount of steam passing through the coil, a greater amount being made to pass through when the engine was heavily loaded than when it was lightly loaded. There were no steam jackets. The exhaust steam passed from the engine to a Worthington jet condenser connected with a Worthington vacuum pump.

The steam used by the engine was furnished by an Edge Moor water tube boiler. From the boiler it passed to the top of the Schmidt superheater, which was set up at the side of the boiler. The saturated steam entering the superheater came in contact with the coldest gases as they left the superheater. From the upper coils the steam passed downward through a pipe outside of the superheater to the bottom of the lowermost set of coils of the superheater, and thus, when only partly heated, was made to pass through the coils which were nearest the fire. This prevented the overheating of the lowermost coils of the superheater, which would have taken place had the steam been made to pass downward all the way through the superheater so as to bring the hottest steam near the fire. From the lowermost set of coils the steam passed upward and back and forth through the coils until it was finally led off from a header directly below the top set of coils and conveyed to the engine. Steam to drive the vacuum pump and for other purposes in the mill was furnished by a separate boiler.

The principal dimensions of the engine, measured when hot, were:

	Inches.
Bore of cylinders	16.07 and 28.03
Length of stroke	42
Diameter of piston rods	3.00 and 3.50

Table I.—Average Data and Results of Engine Tests.

Condition of steam—superheated or saturated	Sup.	Sup.	Sup.	Sat.
Length of tests in hours	5.15	6.033	6	6.50
Water fed to boiler in pounds per hour, corrected for leakage	4,633	4,018	2,684	5,630
AVERAGE PRESSURE.				
Steam at boiler in pounds per square inch	147	147.9	148.5	149.3
Steam near throttle in pounds per square inch	141.2	142.4	145.6	145.1
Steam in receiver in pounds per square inch	21.9	17.6	5.6	20.8
Vacuum near engine in inches of mercury	25.11	25.82	26.32	24.47
Vacuum at condenser in inches of mercury	25.80	26.79	26.81	25.24
Barometric pressure in inches of mercury	30.16	29.80	30.01	30
TEMPERATURE OF STEAM IN DEGREES FAHRENHEIT.				
Leaving the superheater	766.4	808	849	.....
At the engine throttle	713.7	736.3	756.8	.....
Entering the high pressure cylinder	634.4	658.6	672	.....
Leaving the high pressure cylinder	346.5	331.5	287.7	262
Entering the low pressure cylinder	408	395.9	353.6	269.1
Leaving the low pressure cylinder	135.1	128.2	124.1	.....
AMOUNT STEAM WAS SUPERHEATED IN DEGREES FAHRENHEIT.				
Leaving the superheater	402.4	443.4	384.1	.....
At the engine throttle	352.5	374.5	393.3	.....
Entering the high pressure cylinder	273.2	296.8	308.5	.....
Leaving the high pressure cylinder	84.7	77	52	.....
Entering the low pressure cylinder	146.2	141.4	117.9	7.1
HORSE-POWER AND ECONOMY.				
Revolutions per minute	103 28	102.34	102.49	102.20
Indicated horse-power developed by the engine	474.5	420.4	276.8	406.7
Water consumption in pounds per hour per indicated horse-power	9.76	9.56	9.70	13.84
Maximum temperature to which the feed water could be heated by the exhaust of the engine*	133.5	125.1	121.7	148.4
Heat consumption in British thermal units per minute, corresponding to the heat in steam at the throttle valve, and the maximum temperature of feed water—Standard of the Civil Engineers of Great Britain	205	203.7	208.8	248.2
Heat imparted to the boiler and the superheater in British thermal units per pound of dry coal	9,725	9,725	9,725	9,947
Coal per hour per horse-power on basis of the heat consumption recommended as a standard by the Civil Engineers of Great Britain. In this the loss due to radiation of the steam pipe from the boiler to the engine is not charged against the engine, and it is credited with the maximum temperature at which it can return the feed water to the boiler	1.265	1.257	1.288	1.497
Actual water evaporated and superheated per pound of dry coal in test made June 19	.....	7.09	.....	.....
Actual coal burned per hour per indicated horse-power	.....	1,348	.....	.....

* In the fourth test, which was made with saturated steam, allowance is made for the heating effect of drip water drawn from the receiver, which amounted to 280 pounds per hour.

The average clearance volumes computed from measurements made on the engine and from the working drawings were 4.1 per cent. for the high pressure cylinder and 5.8 per cent. for the low pressure cylinder.

After the tests with superheated steam were completed a test was made with saturated steam. The principal results of the tests are given in detail in Table I. From this it may be seen that the water consumption per hour per indicated horse-power with superheated steam was 9.76 pounds at 474.5 horse-power, 9.56 pounds at 420.4 horse-power, and 9.70 pounds at 276.8 horse-power. The pressure of the steam at the engine throttle was slightly over 140 pounds per square inch, and the superheating from about 350 to 400 degrees F. The vacuum measured near the engine ranged from about 25 to 26 inches of mercury. The heat consumption per minute per indicated horse-power, according to the standard recommended by the Civil Engineers of Great Britain, where the engine is charged with the heat in the steam at the throttle valve, and is credited with returning the feed water to the boiler at the maximum possible tem-

* Abstracts from a paper read before the American Society of Mechanical Engineers, New York, December, 1903.

† Professor of Experimental Mechanics and Engineering Physics, Stevens Institute of Technology, Hoboken, N. J.

perature that could be obtained by a feed water heater in the exhaust pipe, was 205.0 British thermal units at 474.5 horse-power, 203.7 British thermal units at 420.4 horse-power, and 208.8 British thermal units at 276.8 horse-power.

With saturated steam the water consumption was 13.84 pounds per hour per horse-power at 406.7 horse-power, and the heat consumption 248.2 British thermal units per minute per indicated horse-power. In this test the vacuum was poorer than in any of the others, being 24.5 inches. It must also be borne in mind that the engine was built for superheated steam, and the cylinder ratio was not what would be used for saturated steam. In computing the heat consumption for this test an allowance is made for the drip from the high pressure steam main at the coil in the receiver. This drip amounted to 280 pounds per hour over what could be accounted for by the radiation of the steam main from the boiler to the engine. This amount of the high pressure steam was, therefore, condensed in the receiver coil, and imparted heat to the receiver in the same way as an ordinary steam jacket.

Tests were made to determine the economy of the boiler and of the superheater. The coal used was run of mine, Georges Creek, Cumberland. The equivalent evaporation from and at 212 degrees F. per pound of dry coal for the boiler alone was 10.30 pounds; for the superheater it was 8.97 pounds, and for the boiler and superheater combined it was 10.07 pounds. The heat of combustion of the coal, determined by means of a Mahler bomb calorimeter, was 14,060 British thermal units per pound. The efficiency of the boiler based on the heat of the coal was 70.7 per cent., of the superheater 61.6 per cent., and of the combined boiler and superheater 69.2 per cent.

The coal consumption may be obtained directly from the heat consumption of the engine already given by multiplying by 60 and dividing by 9725 for the superheated steam tests and by 9947 for the test with saturated steam, 9725 being the heat imparted to the boiler and the superheater in British thermal units per pound of coal burned in the tests with superheated steam, 9947 that imparted to the boiler in the test with saturated steam. When computed in this way any loss of heat by radiation in the pipe leading from the boiler to the engine is eliminated, which is a necessary condition in the present case, as the pipe is exceptionally long. On this basis the coal consumption per hour per indicated horse-power for superheated steam was 1.265 pounds at 475.5 horse-power, 1.257 pounds at 420.4 horse-power, and 1.288 pounds at 276.8 horse-power. For the test with saturated steam the coal consumption was 1.497 pounds per hour at 406.7 horse-power. In the figures just given for the coal consumption the coal used to drive the independent vacuum pump is not included. The figures, therefore, represent what would have been obtained per indicated horse-power if the engine had driven the vacuum pump.

The coal consumption forms a more accurate basis for comparing the efficiencies of engines using saturated and superheated steam than the heat consumption, because when the coal consumption is obtained it allows for any difference in the economy of the combined boiler and superheater from that of an ordinary boiler. In the present tests this difference amounted to 1.5 per cent. in 70, or about 2 per cent., and if compared on the heat unit basis the difference in favor of the superheated steam tests would be too great by this amount.

In the test with saturated steam the coal consumption was about 19 per cent. greater than that obtained at the same power with superheated steam. This does not form a proper basis of comparison, however, for the two reasons already stated, which are that the engine was not built for saturated steam and that the vacuum in the test was not as high as it should have been. An engine of the same general type built for saturated steam, but of about twice the power, was tested by the writer, and the results were embodied in a paper presented by him at the Saratoga meeting. The most economical heat consumption obtained was 222.7 British thermal units per minute per horse-power. The vacuum in this case was exceptionally high, being over 28 inches. If the vacuum had been about 26 inches, as in the present tests, it is probable that the heat consumption would have been about 230 British thermal units per minute per indicated horse-power, and the coal consumption on the basis already given 1.42 pounds per hour per horse-power. As the minimum coal consumption with superheated steam was 1.257 pounds per hour per horse-power there is a gain in favor of using superheated steam of 0.163 pound per hour per horse-power, or the larger steam engine using saturated steam is about 13 per cent. less economical than the smaller one using superheated steam.

Table II gives the average data and results of the superheater tests, stating the combined economy of the boiler and superheater.

Table II.—Average Data and Results of Superheater Test.

Heating surface in square feet	642
Grate surface in square feet	4
Duration of test in hours	14
Pressure of steam furnished to superheater in pounds per square inch above the atmosphere	147.4
TEMPERATURES IN DEGREES FAHRENHEIT.	
Steam entering the superheater	365.6
Steam leaving the superheater	809.1
Amount steam was superheated	443.5
TOTAL QUANTITIES.	
Steam passing through the superheater in pounds	58,025
Heat imparted to the steam in British thermal units	12,352,000
Total moist coal fired in pounds	1,473
Total dry coal consumed in pounds	1,426
Coal burned per square foot of grate surface per hour in pounds	25.5
Heat imparted to the steam in the superheater per pound of coal burned in British thermal units	8,662
Equivalent evaporation from and at 212 degrees F. per pound of dry coal	8.97
Heat of combustion of the dry coal in British thermal units per pound	14,060
Efficiency of the superheater based on the heat of combustion of the coal in per cent.	61.6
COMBINED ECONOMY OF THE BOILER AND SUPERHEATER.	
Actual evaporation of the boiler per pound of dry coal in pounds	8.586
Coal burned in superheater, in pounds, per pound of steam passing through it	0.02458
Coal burned in superheater, in pounds, per pound of coal burned at boiler	0.211
Actual evaporation of the combined boiler and superheater	7.090
Factor of evaporation of the combined boiler and superheater	1.421
Equivalent evaporation, in pounds, per pound of dry coal, from and at 212 degrees F., for the combined boiler and superheater	10.07
Efficiency of the combined boiler and superheater based on the heat of combustion of the coal	69.2

In order to produce an apparently solid image of such an object as a broken bone or a foreign substance imbedded in the flesh, without the aid of X-ray photography, M. Guilloz, a French physicist, causes the tube producing the rays to oscillate by means of a cam revolving 300 times a minute. The cam is so cut that the time taken in moving it from one position of rest to the other is about one-tenth of the period of revolution. Two radiographic images of the same object, as seen from different points, are thus formed on the viewing screen, and by means of shutters, electromagnetically controlled by the oscillating apparatus, the right eye sees one image and the left eye the other, vision being shut off while the tube is changing its position. The result is that the combined image stands out like a solid reproduction of the object.

The Rhenish-Westphalian Electricity Works, at Essen, have ordered from the Brown-Boveri Company of Mannheim a steam turbine to furnish power for operating two electrical generators developing current at respectively 1600 and 5000 volts. The two generators will require about 10,000 horse-power. The whole apparatus occupies a space less than 9 feet in hight, 9 feet in width and about 60 feet in length. The 10,000 horse-power turbine has a length of only 21 feet.

Whiting Punching and Coping Machine.

A machine designed to punch and cope practically all structural shapes rolled at the present time is shown in the engravings. The main frame or body is a single iron casting in box section, made extra heavy and with its sides stiffened by means of heavy interior ribs. The driving and gearing mechanism is also proportioned for great strength and rigidity. The teeth of the operating clutch are faced with tool steel renewable plates. The crankshaft is forged from an open hearth steel billet. The sliding head is made extra long and wide, so as to withstand satisfactorily the excessive stresses due to overhanging work, and is fitted with a bronze gib for taking up such wear as may occur in time. As shown in the smaller illustration, the frame is strengthened by a very heavy central rib extending below the floor line and continuing the outer curve of the frame around under the lower jaw. As plainly shown, the lower jaw is arranged with a very large opening, made deep enough and wide enough to allow the passage of a 24-inch I-beam. The form is also such as to provide for the usual working of various standard structural shapes with the tools furnished with the machine.

While the makers do not advocate the general practice of using a machine fitted with a multiplicity of tools and designed to accommodate an excessively wide range of work, yet it often occurs that firms requiring occasionally a machine for handling the largest shapes have not sufficient work of this nature to warrant the installation of a special machine. The machine under consideration has, therefore, been brought forth with a view to placing within the reach of such firms a machine which, while probably most useful and most used on the smaller sizes of structural shapes, is yet available for occasional use in punching and coping the heaviest work which is likely to be undertaken. This field of usefulness was taken into consideration not alone in the construction of the machine itself, but also in the design of the tools.

Fig. 1 shows the machine fitted with tools for coping large I-beams, and a section of 24-inch beam is represented as being operated upon. Coping tools for the machine are regularly made to suit I-beams and channels from 6 to 24 inches inclusive, necessitating the use of two sizes of lower jaw blocks, in order to give proper clearance for 6-inch beams, and to maintain proper strength under the knives for coping 24-inch 100-pound beams. The arrangement of the knives and the manner of their adjustment have been devised with a view to simplifying the construction in such a way as to render it possible to keep the knives sharp and in good condition at less expense and with less trouble than are commonly required. Both the blocks and the knives of different sizes and forms are, of course, freely interchangeable.

The arrangement of the machine for punching flanges of I-beams or channels is illustrated in Fig. 2. Flange punching tools of the type here shown are provided for piercing holes either two at one time or singly, as may be desired, while the coping blocks are provided in two sets to accommodate the extreme range of the machine's capacity. As already noted, the blocks for punching are made double ended, as shown in Fig. 2, the 6-inch beams or channels fitting one end of the blocks, as illustrated, while the larger sizes up to and including 24 inches are accommodated by reversing the blocks on the lower jaw of the machine. These blocks are fitted with dies held in tool steel holders and having beveled upper faces, so as to conform to the 1 in 6 standard taper of I-beam and channel flanges. Adjustment is provided so that the blocks may be spaced at different distances apart to suit the several web thicknesses, not only of various depths of rolled shapes, but also of all weights of each depth. It is stated that any class of flanged work may be punched by these tools, provided the leg does not exceed 24 inches in depth. Angles and Z-bars may also readily be punched in either leg. Web punching tools are also furnished, suitable for piercing not only the webs of beams and channels, but also for punching plates, angles

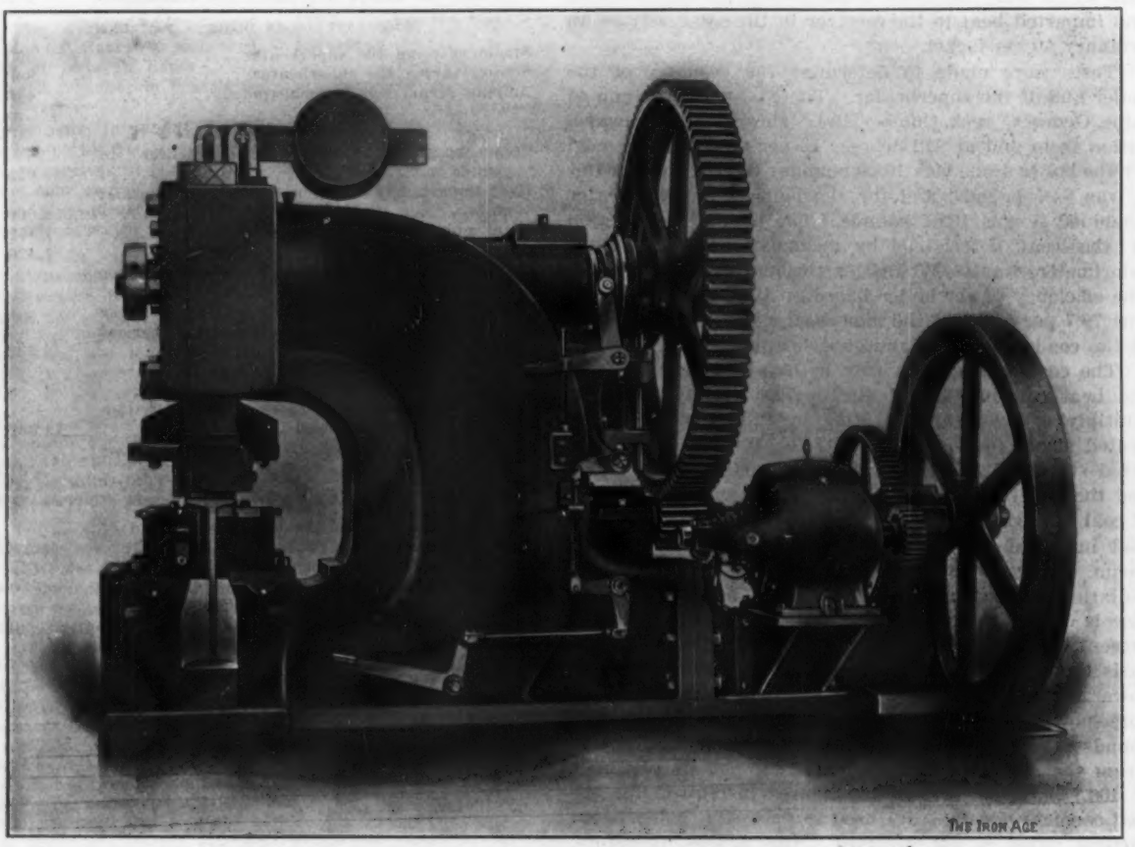

Fig. 1.—Coping a 24-Inch I-Beam.—Method of Mounting the Motor.

WHITING PUNCHING AND COPING MACHINE.

and Z-bars. The punch and die holders are made from forged tool steel and are adjustable throughout a wide range of center to center distances. This range is from a minimum of 2 inches to a maximum of 20 inches. The die holders are of tool steel, as already mentioned, and are made of extra hight, so as to allow punching of the angles in either leg without necessity for turning around. This same feature applies to Z-bars as well.

Washer punching tools are furnished when desired for making filler washers, one at each stroke of the machine, from strips or from scrap plate. The inner and outer punches for this work are set tandem, and the larger punch has a taper tit of hardened tool steel for centering the large hole with the small one. Punch and die holders in this case also are made of tool steel and all parts are designed to be amply heavy for the work required.

The adaptation of this machine to the work already outlined is held to warrant the claims of the makers that the whole range of structural work is practically covered with this one machine. Of course any of the particular tools enumerated may be dispensed with if desired, and the machine used as a plain coper or punch. The makers are the George Whiting Company, Chicago, Ill.

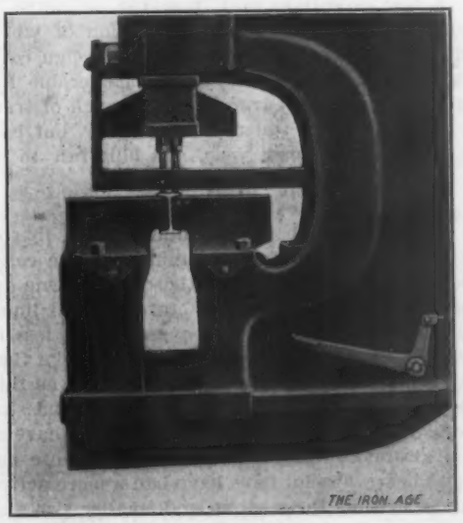

Fig. 2.—Punching the Flanges of a 6-Inch I-Beam.

WHITING PUNCHING AND COPING MACHINE.

Recent Developments in the English Pig Iron Trade.

The London *Economist* of December 5 prints the following article relative to recent developments in the English pig iron trade:

Prices on the pig iron warrant market this week have not only touched the lowest point of the year, but also the lowest point registered since 1898, when, however, the conditions and influences which work in an adverse way on operations were very much worse than they are today. The sagging movement, which, for the time being, it is hoped in many quarters may have culminated, has been in progress for close on three months; but it is in the past few weeks that the pace has been rapid, and its course brought sharply home to the notice of speculators. In the opening days of September, Cleveland warrant iron was fetching 47 shillings, cash, and Scotch close upon 52 shillings; on Thursday afternoon, the former was no better than 41 shillings 4½ pence, cash, sellers, and the latter than 48 shillings 6 pence, losses respectively of 5 shillings 7½ pence and 3 shillings 6 pence a ton. Nowadays, there is hardly ever a transaction in Scotch, for dealing in which the market was at first instituted, and the movements in which for years constituted the price barometer of the iron trade of the world. All that is changed, for the specific reason that there are no warrants to gamble with, and the one time premier article rises and falls automatically, in sympathy with the changes in the Middlesbrough product. Owing to the general shortness of warrants, and the fear of a "corner," which has been always present, and is still possible, dealers have been treating cash business very tenderly for some time back, with three months ago one or two brokers offered, and parted with, a very large quantity of iron—many thousands of tons—for the quarter's delivery at from 6 to 10 shillings a ton below the then current cash quotation. At the time, the proceeding was looked upon as very risky, despite the signs of declining legitimate trade. But it has proved the most successful move of the year, the outcome of rare tactics on the part of those concerned. It is an open secret now that the selling was largely on behalf of long headed Middlesbrough makers, who hid their hands by putting their transactions through the recognized bears in the "ring." In no other way could the thing have been done, or buyers been found for the amounts that were planted. Three months ahead seemed a long time, with the chance, which buoyed up purchasers, of a squeeze in the interval, but the period of delivery has come, the expected relief is unrealized, and the bulls are 4 shillings or more a ton out of pocket. As the situation in the past week began to be fully realized, and the buyers, who did not wish to take delivery, endeavored to get out, Cleveland dropped in a couple of days fully 1 shilling 6 pence a ton, and would have lost even more had the original sellers not taken their iron, or part of it, back. They did so, it may be said, on their own terms, showing no anxiety, and easily picking up from 20,000 to 30,000 tons, which, on the low average of only 3 shillings a ton, means a handsome profit. Besides, some heavy long accounts were, it is understood, adjusted privately; that fact weighed heavily with dealers on Thursday, when many London selling orders (clearing out) were in evidence. It need hardly be said that a like operation will not easily be repeated. There have been attempts in the last few days to place more three-months iron at down to 41 shillings 7 pence, but buyers are shy, and, after the sharp experience they have just had, are likely to remain so. It follows that makers are left with the iron, of course, on easier conditions than were previously possible, still the invisible stocks will to an extent be increased. Public stocks are light—more so than they have probably ever been since statistics began to be recorded. But uncertainty exists as to what Cleveland makers have in their yards—a few years ago they ceased issuing official returns—and, after what has just occurred, doubt on the matter will have something more to feed upon. Recently, to the surprise of every one in the trade, some English makers of hematite proved to have unwieldy stocks in their possession, and they were obliged to shut down. That is not likely to arise in the case of Cleveland iron, but operators are concerned as to the real position, and with home demand on the wane and foreign shipments falling away seriously, they are sure to give the market a wider berth than usual. To make matters worse, arrangements have this week been concluded for resuming the import of Canadian iron from Cape Breton to the Clyde. These were suspended during the late boom in the United States, but now that that door has been closed, the Dominion producers have again turned to what seems their only open port. In 1901 Canada sent 53,000 tons of iron to this side of the water, the whole of it being landed in the Clyde, and in the early part of last year they shipped, on old contracts, 50,500 tons (46,000 tons to the Clyde). From now onward, it is admitted that the shipments will be regular, for the makers get a bounty of over $2 a ton on all they export; and as the bounty declines year by year, it is to their interest to force the pace and dump as much as possible. How does the new Imperial fiscal policy stand to this proposition? The Canadian iron will enter into direct competition with Cleveland, of which large quantities are now sent into Scotland, and is lower in price, the lowness being regulated by the exigencies of the home sellers. The cargo now being shipped is of several thousand tons.

The Philadelphia Machinery Market in 1903.

Conditions in nearly all branches of the Philadelphia Machinery Market during 1903 have varied greatly. From almost unprecedented activity during the early months of the year, to extreme dullness during the last half, and particularly the last few months, is a change which was scarcely anticipated.

Manufacturers entered the year in most cases, with order books comfortably filled and new business coming in freely. Builders of large and heavy special machinery, engines, cranes, &c., were taking orders subject to long time delivery, some being covered for their output for six months ahead, others had from four to eight months' work ahead, and delays in delivery were the rule rather than the exception.

But as the year advanced conditions changed; in the mid year it was evident that we had not only reached the hight of prosperity, moved along on the top of the wave, but were started down the decline.

The demand became weaker and weaker, and the past few months have found machinery requirements few and far between. Even with the prosperous conditions of the first half of the year, machinery and tool builders did not have all plain sailing. The aftermath of the great anthracite coal miners' strike was being felt. Anthracite coal was still scarce, coke, even of inferior quality difficult to obtain, and pig iron and other raw materials equally scarce and high in price. Frequently from the lack of one or the other raw material, and sometimes both, manufacturers were compelled to temporarily close their plants until supplies could be obtained. More or less trouble was also experienced with labor, and difficulties and delays were as frequent and of greater importance from disturbances outside the trade than from those within. Labor difficulties in the building trades influenced trade conditions to a very marked extent, and are frequently quoted as being a prime factor in the beginning of the end our prosperous conditions. Since the middle of the year practically nothing has been done in building and improvements to plants, except in cases of urgent necessity. Some of the plants find that the large increase in facilities under existing conditions is somewhat of a detriment, capacities in some cases were increased 100 per cent. and more, and heavy expenses added therefore to fixed charges. This was all well enough under circumstances governing business during 1902, but it makes a heavy burden to carry in times when conditions are not the brightest.

One of the principal reasons offered for the present decline is the excessive productive capacity of many plants. While these plants were building, and extensive additions being made to others, manufacturers of tools, machinery and other equipment were being rushed to furnish the necessary requirements for these undertakings. When this work was all completed, not only was the prospect of new business from the same source remote, the plants having been equipped with the latest and most modern machinery, but a new producer was in the field and was grasping for business, and, while the purchasing power at this time is the greatest in the history of the country, the requirements and needs for practical business are fewer. Buyers, therefore, think more than once before placing an order, and the purchase of this or that tool is more frequently deferred than covered. The condition is not confined alone to machinery trades, but is prominent also in those allied to them. Pig iron production has been largely decreased; steel mills have been working on largely reduced tonnages; rolling mills have temporarily closed down; reduction in the wages paid labor have been made in some lines and will be extended to others after January 1.

Inquiries for new machinery and tools have during the last half of the year been misleading. Some manufacturers have been in receipt of a large number covering various lines of tools, but, after quotations are made, the business is usually held up. There has probably been a strong tendency to feel the market, and defer actual business until 1904.

Export Trade.

The past year has been without developments worthy of note in the export machinery trade. In the early part of the year manufacturers were not particularly interested in this trade, the domestic business giving them as much work as they were able to handle at that time. What foreign business came in was of the class on which trade had long been established, and which was without extensive competition with foreign goods, and even this at times was weak.

When, however, the domestic demand began to fall off, more aggressive means were adopted by manufacturers to get some of the foreign business. Conditions abroad, however, during the past year have not been conducive to extensive purchases of machinery and tools, and particularly at the prices of to-day, and the results in this direction have been anything but satisfactory. There is scarcely any doubt but that in order to make our machinery and tools attractive to the foreign buyer prices must be worked to a lower level than is being maintained to-day. Under existing conditions it is hardly probable therefore that any general resumption of the foreign trade which we had will be realized at an early date. A few exceptions may, however, be noted, in the line of pneumatic tools, the introduction of which has forged steadily ahead in a number of foreign countries. Molding machines have also made considerable forward movement in the export trade. This branch of trade had in the last few years fallen off materially, but has been regained during the past year, and bids fair to assume larger proportions during 1904.

The Machine Tool Trade.

As in other lines in the machinery trade, that of machine tools has fallen from extremely active conditions at the beginning of the year to those of extreme dullness during the latter part. Manufacturers of all lines have felt the decline in business to a greater or less extent. The large extensions of various new plants kept the trade active during the early half of the year, but as this field became supplied, the demand began to lull, and since the middle of the year builders of machine tools have experienced a gradual falling off in business. Those building large and heavy special tools have had a more active year than those making the medium and smaller size standard tools. Locomotive builders have had a better year as far as production is concerned than ever before, but they are the exception to the rule. Difficulties regarding supplies of raw materials were experienced in the early half of the year, interfering with deliveries of machine tools to a considerable extent, but as supplies became better the demand appeared to weaken, and no difficulty was experienced in making deliveries during the latter months of the year. The falling off in demand has resulted in some cases in the temporary closing down of some of the plants and the reduction of working hours at others, and some have found it necessary to lay off for a time some of their employees; the opinion being that it was more advisable to curtail production than to accumulate stock, but in some instances manufacturers were glad of the opportunity to make up a stock of various tools, their supplies having been depleted for a long time.

Engines, Boilers and Smaller Tools.

The years business in these branches of the trade have followed generally those of the other lines, being more active early in the year and declining as the year advanced. Engines and boilers had a very fair business throughout the first three-quarters of 1903. The manufacturers of the smaller standard tools have at times probably not had as extensive orders ahead, as did the manufacturers of the larger tools, but until late in the fall a fairly good business was done, a large part being for additions and replacement of tools in working plants. Prompt deliveries have generally been made in these tools throughout the year, more particularly during the latter half.

Shipbuilding.

The various local and nearby shipyards have nearly all experienced a decline in business during the past year. The demand for merchant vessels appears to have fallen off to a considerable extent, but the year's total at some

of the yards has been improved by the receipt of several large Government contracts for battle ships and crusiers, as well as other Government vessels. A number of vessels have been launched during 1903 and nearly all the yards have a number of vessels in course of construction. While the outlook for immediate new business is not very encouraging, there is sufficient work in hand to keep the yards in active operation for some time to come.

Improvements to Plants.

While the improvements to the various manufacturing plants during 1903 have not been as extensive as those of the previous year, some large additions and new plants have been erected. Several of these, however, were carried over from 1902, and others began building during the first half of 1903. With the declining demand for machine tools and other equipment, manufacturers in these lines found further expansion unnecessary. Some of the plants now under construction will not make their further requirements known until this year, while others have already placed their contracts.

The Pennsylvania Railroad Company have expended during 1903 large sums for additional terminal facilities in this city and nearby points. At Shellpot, near Wilmington, Del., they have completed the erection of extensive new repair shops, which are now being equipped, and the removal from their old Wilmington shops has been completed.

The Midvale Steel Works, which recently obtained an order for 6180 tons of armor plate for the United States Government, will make extensive improvements to their plant in order to manufacture this material, and a contract for a large addition to their forge shop has already been given out.

The Baldwin Locomotive Works, while not starting new additions during 1903, have completed several which were contemplated and under way from the previous year. The added facilities have greatly increased the capacity of this plant for building locomotives. From a yearly production of 901 engines in 1899 their capacity increased to 1530 in 1902, and was further increased to 2010 during 1903—a gain of practically 24 per cent. over 1902 and 123 per cent. over the production of 1899. The capacity of the plant under present conditions can readily be estimated at 170 engines per month.

Edwin Harrington & Son Company, Incorporated, are building an extensive plant for the construction of machinery and tools. The building for this purpose is now practically completed and it is expected that the installation of machinery will begin at an early date.

The Alan Wood Iron & Steel Company have built an extensive plant near Philadelphia for the manufacture of steel billets, bars, sheets and plates. This plant, it is said, is one of the most modern steel plants in the United States. Rumors are also afloat as to the building of several extensive plants both for the manufacture of materials entering into the construction of machinery as well as machinery itself, but owing to the general unsettled condition of affairs not much dependence is being placed in these at this time.

Iron and Steel Foundries.

Iron and steel foundries have been generally busy throughout the year. While there has been a falling off in demand during the past few months, a considerable amount of work is on hand, and will no doubt furnish employment for some time ahead. Improvements to gray iron foundries have not been so extensive during the past year, the new plants of Williamson Bros. Company, consisting of two foundries—one 53 x 210, the other 55 x 175 feet—being probably the most important. The continued and increasing demand for steel castings has presented opportunities for new plants for this class of work, and in this territory we note three in varying stages of erection. The Brylgon Steel Casting Company, now of Reading, Pa., are building a large new plant at New Castle, Del., as are also the Baldt Steel Casting Company, a new concern. A plant is also to be built at Chester, Pa., by the Delaware River Steel Casting Company.

Prices.

Prices have varied to some extent during 1903. Advances on the general line of standard tools were made early in the year, when fuel and other raw materials were scarce and high in price, and buyers were mostly willing to pay a premium for prompt delivery on orders. Wages were in instances increased, and everything which entered into the construction of tools and machinery was at a high cost, and advances in prices of tools, &c., were thought to be justified under the existing conditions.

Since the decline in demand, circumstances governing the building of machinery have varied but little; raw materials, pig iron and fuel have declined, but labor costs and fixed charges have remained the same. Prices, therefore, have been fairly well maintained, and while some cutting of price has been done, but little change in list prices is noted, and it is said that to-day's figures will be maintained for the year. Whether this can be done in the face of probable lowering of cost of labor and raw materials and the probable accumulation of stocks is a question on which opinions differ.

Outlook for 1904.

There is considerable difference of opinion as to the probable business for 1904. The postponement of orders for machinery and tools during the past month or two is taken by many to mean that business in good volume will surely be placed early in the year. Very few plants have any extensive work ahead, a few have sufficient orders on their books to keep them going for several months, but confidence in the coming year's trade is not particularly strong.

Presidential years, as a rule, are "off years," and many purchasers are unwilling to make heavy expenditures for new equipment until after the national election. Nevertheless, some business will certainly develop, machines and tools wear out and have to be replaced, and improvements are being made in tools in different classes, which are more advantageous in every way than many of those in use at the present time, and the new plants and additions already under way will require considerable machinery of various classes. The railroads will no doubt come in with their regular requirements for the year, while business if not sufficiently large at home must be developed in other territories. Generally speaking, 1904 is looked upon by many as a year in which a good average business will develop, not of the class with which we have had experience in the past few years, but good, solid conservative business, and enough of it to go comfortably around.

There are upward of 100,000,000 cotton spindles in the world, and three-fourths of all the material used by them comes from the cotton fields of the South; but that section, with all its recent progress, has only 8,000,000 spindles. The entire country has only about 22,000,000. We are still shipping to Europe over 60 per cent. of our raw cotton every year; but would be aghast at the idea of exporting our iron ore, instead of turning it into the finished product here, where it is obtained. The South is now producing about 10,500,000 bales per year, with a total value of perhaps $550,000,000.

A steam locomotive recently completed in Düsseldorf, Germany, for use in factories which handle high explosives in bulk, carries no fire with it. On the contrary, the steam is generated outside, and the boiler of the locomotive charged with it, the operation requiring about half an hour. It is then able to operate for several hours, after which the recharging occupies about 15 minutes. The operation is so simple that unskilled workmen are placed in charge. It is said to be only about one-half as expensive in operation as the ordinary locomotive.

Californian redwood has been found exceedingly useful in the construction of the big pipes used for the conveyance of water to many of the electric power houses in the northern part of the State. These pipes are built up and banded. They cost less than metal pipes and are more durable. The redwood will outlive all other woods when kept constantly moist. Moreover, it burns much more slowly than any other kind of timber used for building purposes, as it contains no inflammable oil or resin.

Rapid Machining of Crank Shafts.

Advanced Methods Employed at the Eddystone Works of the Tindel-Morris Company.

I.*—ROUGHING OPERATIONS.

There is a growing inclination among engine builders and users of crank shafts in general to abandon the old time custom of buying rough forgings and to ask the forges to furnish the crank shafts in their finished state. In some cases the issue is met half way, and the forges quote on what they name "roughed" shafts, which are machined to within ⅛ inch or less of the finished dimensions

This phase of this particular class of trade has induced the operators of forges to expend considerable effort and ingenuity in devising special equipment for the purpose of machining their forgings at as low a cost and in as rapid a manner as possible.

As there is an especially tenacious scale on the rough forgings and as the prime object is the removing of it with rapidity, the high duty tool steels are employed very extensively in this work.

The Tindel-Morris Company, who operate the Frankford Steel & Foundry Works and the Eddystone Engineering Works of Ellwood City and Eddystone, Pa., have dipped into this subject rather deeply, and as a result have at their Eddystone works a plant excellently equipped for the roughing and finishing of crank shafts according to most approved methods.

For the roughing operations four types of special machines are employed. In this work speed is the most essential factor, and after the shafts are laid out and the various centers accurately determined the superfluous metal is removed in remarkably short time.

When a crank shaft forging is brought from the hammer it is taken to a long, low iron table, the top of which is a perfectly level horizontal plane of one piece. Here the forging is leveled up and laid out according to centers. A centering machine is then employed in drilling the center marks, and the piece is ready to be taken through its various stages toward completion.

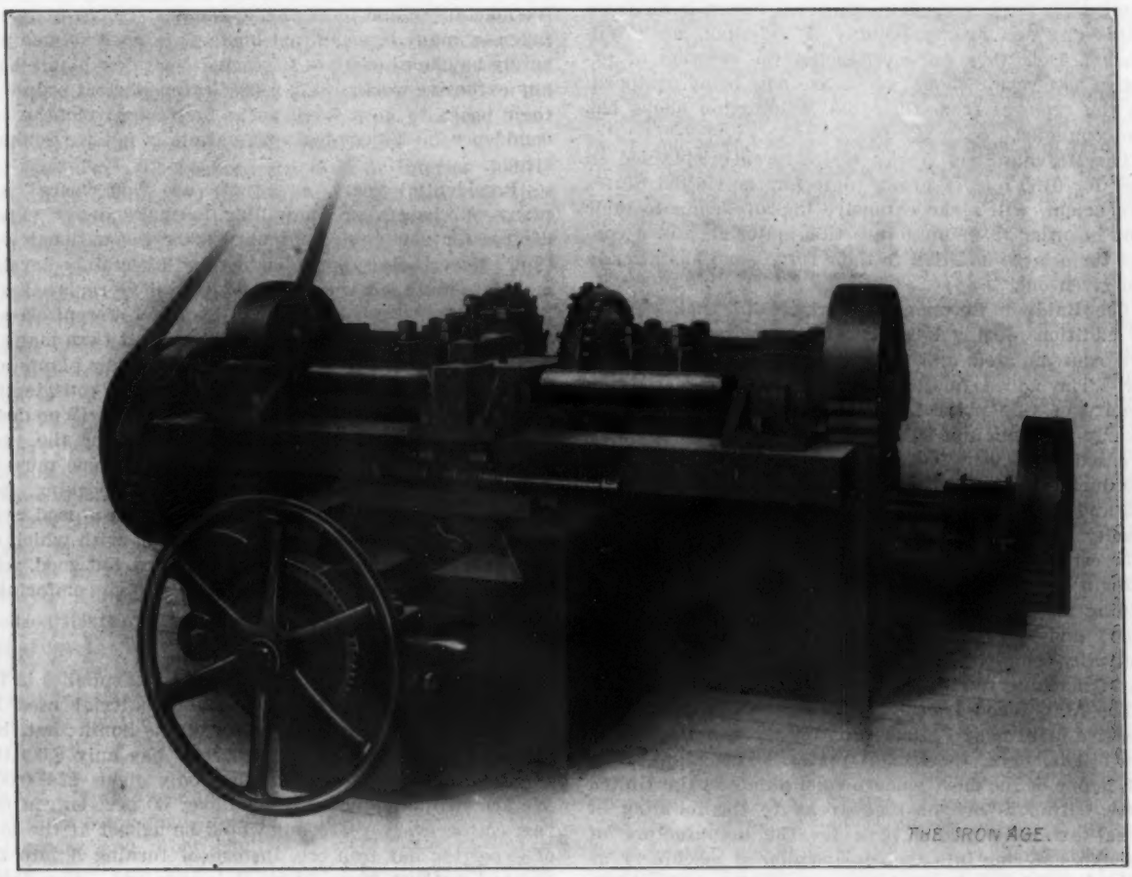

Fig. 1.—Double Head Milling Machine.—The Forging in Position on the Machine.

RAPID MACHINING OF CRANK SHAFTS.

In this article it is intended to dwell only upon the roughing operations or the means of producing a crank shaft within ⅛ inch or less of its finished state. With the special equipment employed at the Eddystone works of the Tindel-Morris Company it has been found more economical to machine the superfluous metal off than to take the time required in forging very close to finished size. A rather considerable amount of metal is therefore allowed to remain on the rough forging purposely for the machines to remove.

These machines are four in number, and we illustrate them in their regular rotation of successive operations on the work.

For the purpose of establishing uniformity of conditions in the comparisons as to the length of time required in the several operations, we shall take one type and size of crank shaft and our references will deal with this throughout this article. This will be a single throw crank, 8-inch centers.

* In a future issue we shall present an article on the finishing operation, describing a special machine designed by Mr. Tindel for this purpose.

When the forging has been properly laid out with the centers marked, &c., it is picked up by the traveling crane and placed on a double head milling machine, the first of the five special machines. As will be seen in Fig. 1, the forging is held by means of a pair of centers on the ends. In order to prevent its rotation the forging is securely clamped in the center. The milling heads are then adjusted so as to take the proper amount of metal off of each of the cheeks, and the work is fed forward between the milling heads. As will be noted from the engraving, Fig. 1, the main driving shaft is splined, thus enabling the two milling heads to be moved complete, together with their housings, longitudinally along the shaft, for the purpose of adjustment to suit the width of the work in hand. The machine has a power feeding device and a quick return controlled by the hand wheel shown in the front of the engraving.

The performance of this machine is very interesting. Its first advantage over the ordinary lathe method is that the milling operation permits a continuous removal of metal. In the case of the lathe or any machine where the tool is stationary the tool is in contact with the work but a very small portion of the time of turning, owing to the fact that the surface to be reduced constitutes but a small area of the complete circle of travel. Another saving is effected by the use of the double head mill machine, inasmuch as both surfaces are reduced simultaneously. Before this machine was in use an engine lathe with two carriages was employed, and it was considered a good day's work when a man performed the work on five crank shafts in a day of ten hours. At the Eddystone works this machine is turning out 30 forgings in the same time without being driven to its fullest capacity. This shows the performance of the same work in one case as in the other at one-sixth of the cost. The machine is run at a feed of ⅝ inch per minute continuously, taking a cut of 1-32 inch on a side. This machine can also be used for finishing the work for which it was designed.

The next operation is the drilling of the holes preparatory to the blocking out of the crank. This is performed on an ordinary drill press.

The work is then taken to the second special machine, which is illustrated in Fig. 2. The work of this machine is to turn down the journals. The work is placed between the centers of the machine and is securely chucked in the center by means of the blocks and screws provided in the circular chuck. Around the outer edge of this chuck there is a spur gear ring, which is rotated by means of a spur pinion attached to the main driving shaft in the back of the machine. The operator then places the tools against the work at the shoulders, and as the lead screw contains a right and left thread, the carriages travel outward to the end of the journals, both journals being reduced at the same time.

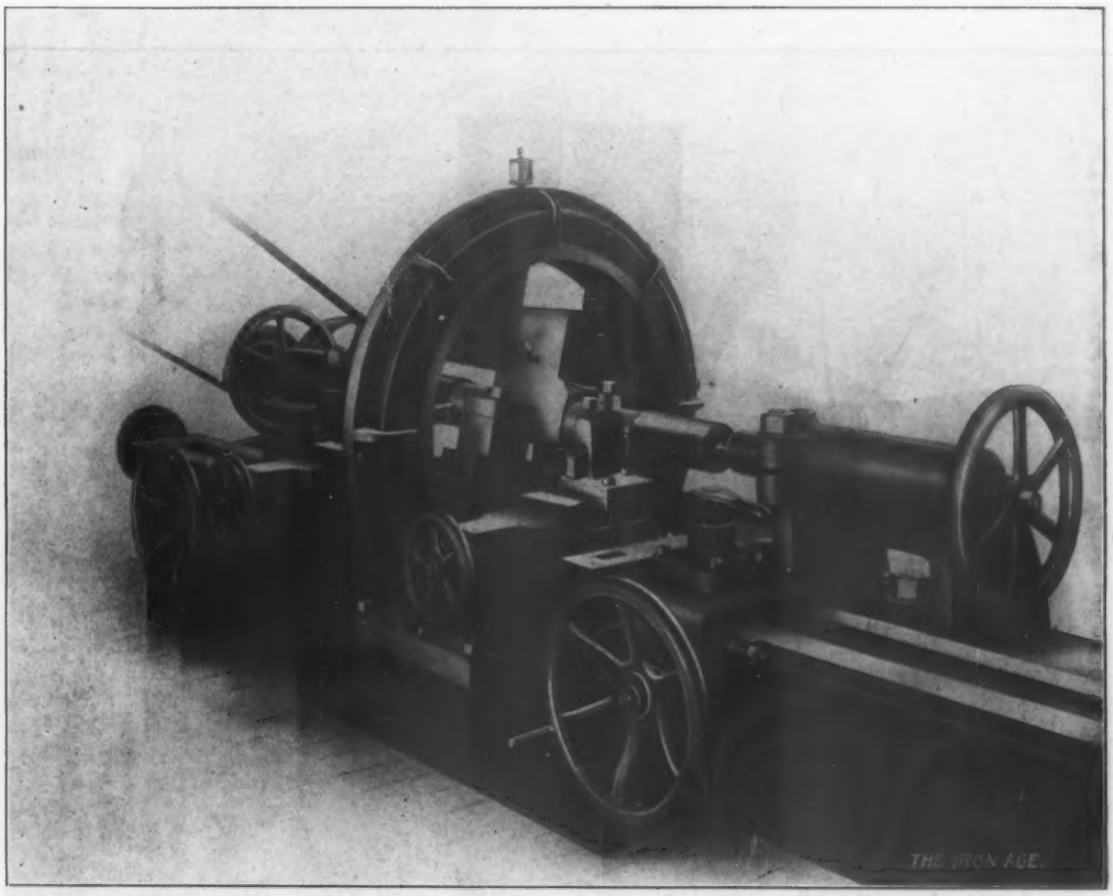

Fig. 2.—Double Carriage Lathe with Center Drive.—Turning Both Journals Simultaneously.

RAPID MACHINING OF CRANK SHAFTS.

The journals on an 8-inch center crank are each 30 inches long from the throw to the end. On this machine 20 cranks of this size are turned daily. With an ordinary lathe it was formerly a good day's work when six were turned. The feed maintained on this machine is about ⅛ inch, and the depth of cut is about ½ inch, reducing the journals 1 inch per turn. This cut is maintained at the rate of 30 feet per minute.

For the operation of blocking out the throw, an adaptation of the Tindel high duty cold saw is employed. A complete description of this saw was printed in *The Iron Age* under date of December 3. The special machine, which is illustrated in Fig. 3, contains two saw blades on the same arbor and properly spaced to conform to the width of space to be cut, by means of washers. The operation of the machine is very simple and the high power of the driving mechanism, together with the strength of blades and general rigidity of the machine, permit its cutting into the steel with remarkable rapidity.

The saw blades are fed into the work at feeds ranging from ½ to 1½ inches per minute, according to the thickness of the work. The last named feed is used on cranks 2½ inches thick at the throw. On this machine 30 8-inch center cranks are blocked out in a day. Formerly an 18-inch slotter was used, and with a specially constructed head having two tools six cranks were blocked out in a day. The double tool arrangement was not entirely satisfactory and with a single tool only half the work was accomplished.

Following this, there is another sawing operation which is very interesting from the standpoint of rapidity. It is the sawing off of the ends of the shafts. The end of a shaft 6½ inches in diameter is sawed off in five minutes. This is accomplished on a machine which is another adaptation of the Tindel saw. With the ordinary solid circular saw the best practice on this work has been about ¼ inch feed, or lineal cut, per minute. When a lathe is employed the work is not entirely satisfactory, owing to the projection which remains at the centers.

In Fig. 4 a machine is illustrated which performs an important operation in a rather novel manner. It is the turning of the crank pin. The operation of the machine discards entirely the lathe method of holding the work by centers and counterbalancing the weight of the throw. It embodies the chuck principle. The shaft is clamped in a special form of chuck by the journals. The jaws of the chuck are fastened to a slide within the inside of the drum, and by inward or outward movement of this slide the crank pin is brought in center. Graduations are provided on the slide to secure accuracy and save time. When the crank pin is central with the center of the chuck the crank shaft is clamped into position and a pair of heavy driving jaws are locked by means of bolts to the cheeks of the crank close to the pin to be turned.

Provision is made for inserting the journal of the shaft to which the clamping is done through the chuck into the head of the machine. The heavy spur gear drive, which is directly on the chuck itself, imparts great power and the cutter carriage is also of unusual massiveness.

By reason of this great rigidity a square nose tool can be used, which, as a rule, is about half of the length of the pin. This permits the rapid reduction of the work.

On this machine the average time required for reducing the crank pin of an 8-inch centers crank shaft is about 20 minutes. By using the ordinary lathe method the same work requires two hours. This is due to the fact that with the work being driven from a face plate very heavy cuts are impracticable owing to the tendency toward springing of the work.

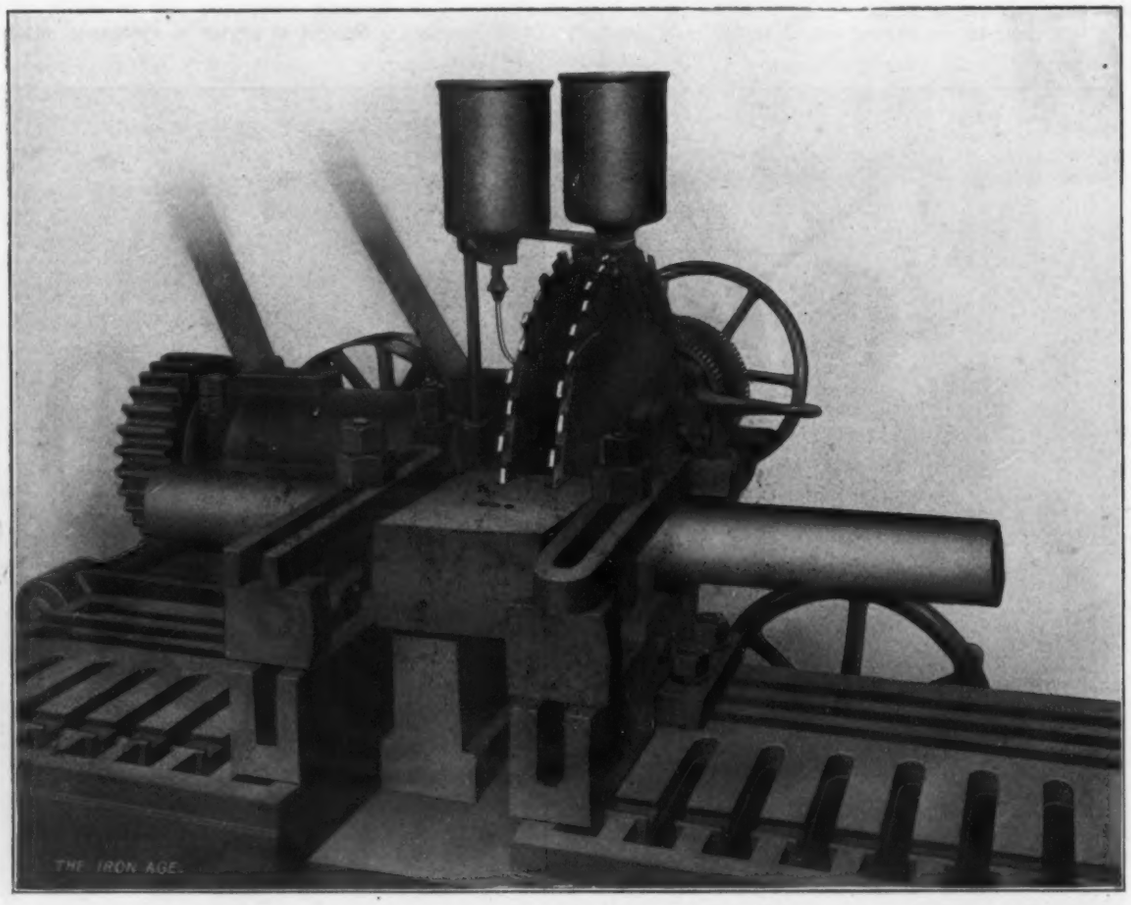

Fig. 3.—Double Saw Slotting Machine, Showing Method of Blocking Out the Throw.

RAPID MACHINING OF CRANK SHAFTS.

It is said that rubber of excellent quality has been extracted from the American scrub tree known as the chico or greasewood, from which the knotty canes fashionable a few years ago were made. The experiments were made at Akron, Ohio, from wood shipped from Southern California, and a plant for its manufacture will be located in the Southwest, where the greasewood is found on otherwise barren soil. The product, which is secured by boiling, has all the qualities of Para rubber, except that it cannot be used for erasing, and its cost will be 35 cents a pound, as against $1 or more for the imported rubber.

Hitherto there has been no connected time table for a journey around the world, and the best record made is 63 days, via Capes Horn and Good Hope. An effort is now being made to arrange connections. The Canadian Pacific Railway can now make connections via Hong Kong which will enable the globe trotter to encircle the globe in 52½ days, with the aid of British steamers. The railway and steamers operated by J. J. Hill can take one via Puget Sound, the Siberian Railway and London in 45 days.

The Lead Market in 1903.

BY E. A. CASWELL, NEW YORK.

At the present time any broad review of the lead market is largely a narration of the formation, development, progress and new affiliations of the several large aggregations of capital which are now conducting the business. It is fair to say that nine-tenths of the entire business in lead is now conducted by the following concerns—viz., as to producers, the American Smelting & Refining Company, the Federal Mining & Smelting Company, the St. Joseph Lead Company, at Bonne Terre, Mo.; the Balbach Refinery, at Newark, N. J.; and the Selby Refinery, at San Francisco; as to consumers, the United Lead Company, the National Lead Company and the Eagle White Lead Company. There are a few others, but they are not important or disturbing factors. In our review of 1902 we pointed out that the policy of the American Smelting & Refining Company was to secure control, either of the producing power, which precedes their own field, or in the consuming power, which follows it. At the close of 1902 an amalgamation of the United Lead Company and the National Lead Company appeared imminent. For some reasons, which were never made very clear by either of the parties, a rupture occurred between those two concerns, and the United Lead Company turned their attention to securing the concerns which manufacture common lead. Thus far, their acquisitions have been as follows:

American Shot & Lead Company, St. Louis, Mo.
Bailey & Farrell Shot Works, Pittsburgh, Pa.
E. W. Blatchford & Co., Chicago, Ill.
Chadwick-Boston Lead Company, Boston, Mass.
Chicago Shot Tower Works, Chicago, Ill.
Collier Shot Tower Works, St. Louis, Mo.
Gebhardt White Lead Works, Dayton, Ohio.
Gibson & Price Company, Cleveland, Ohio.
Hoyt Metal Company, St. Louis, Mo.
Lausten Lead Works, Chicago, Ill.
Le Roy Shot & Lead Works, New York.
McDougall White Lead Company, Buffalo, N. Y.
Markle Lead Works, St. Louis, Mo.
Northwestern Shot & Lead Works, St. Paul, Minn.
Omaha Shot & Lead Works, Omaha, Neb.
Raymond Lead Company, Chicago, Ill.
Robertson Lead Company, Baltimore, Md.
Thomas W. Sparks, Philadelphia, Pa.
Sportsman's Shot Works, Cincinnati, Ohio.
Tatham & Bros., New York.
Union Lead & Oil Company, New York.

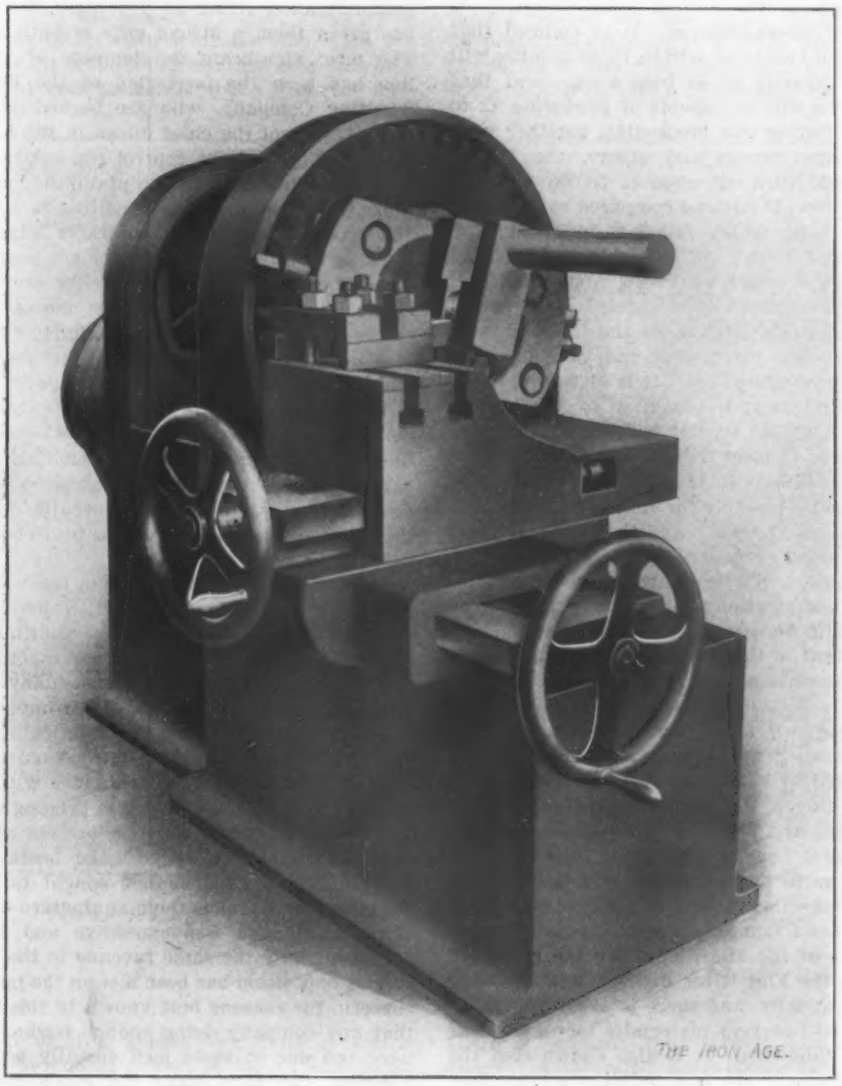

Fig. 4.—Crank Pin Turning Machine, Showing Method of Chucking Shaft by the Cheeks.

RAPID MACHINING OF CRANK SHAFTS.

It has been stated that the total consumption of this aggregation of companies will be not far from 100,000 tons. Some authorities consider that figure too high, and place it nearer to 85,000 tons. This latter figure is also not very far from the total amount used by the National Lead Company. The general expectation of the trade is, that these two concerns will eventually gather under one roof. It must, however, be confessed that there are at present no indications whatever to justify such a conclusion. It must be observed that the National Lead Company have confined themselves entirely to the old Dutch process, whereas the capacity of the United Lead Company, for making lead, is almost exclusively based on the Bailey quick process of corrosion. Rivalry regarding the merits of each process runs high, with one party claiming, in the name of progress, that the old

method is a thing of the past and clung to merely on the foolish theory that "What always has been is best," while the others claim that there is a subtle power in the alchemy of the slower processes of nature which give a density and quality which can be secured in no other way. There is no doubt a very deep rooted bias in the mind of the practical painter in favor of Dutch process lead. In deference to this favoritism, the United Lead Company are putting some facilities for making lead on that plan in their words at Granite City, Ill., which they are now building, and will also include some in their Perth Amboy works. The merry war of competition between these two large companies is likely to be carried out on this question of process quite as much as on the important matter of prices.

The outline work of the United Lead Company is being made on very liberal figures. It is claimed that the Union Lead & Oil Company within three months will have a producing capacity of 40 tons a day, and that the McDougall works will be capable of producing 12 to 15 tons per diem. Taking this production, together with their Chadwick-Boston works and others, the United Lead Company would turn out close to 30,000 tons per annum. That, however, is nothing compared to the proposition at Granite City, which promises to be able by August 1 to make 100 tons a day of white lead, not to mention the projected works at Perth Amboy. If all these rose colored proposals are carried into actual execution we shall in the autumn see the United States in a position to produce just double the amount of its present consumption of white lead. It is also stated that the United Lead Company, in making by the Dutch process at Granite City, do so, not because they believe in it, but merely so as to meet the demand from painters who have the aforesaid bias in favor of that quality. It does not seem normally possible for these two large concerns, the United Lead Company and the National Lead Company, to work along very smoothly on parallel lines; but whether the solution will be a harmonious agreement, or, eventually, that absorption which the lion practices on the lamb, is yet to be seen. Some hint of a clash is thought to be apparent in the recent rupture in the Sheet Lead and Pipe Association and in the prices on those articles.

Turning to the question of new refineries, we note that the Everett smelter and refinery, at Puget Sound, Washington, reported to have been recently acquired by the American Smelting & Refining Company for $1,025,000, is to be enlarged and put into excellent shape. The growth of the Federal Lead Company at Alton, Ill., has not yet been such as to become in anywise a dominant factor. In this connection it might also be mentioned that the National Lead Company are now building a refinery on the banks of the Mississippi for the reduction of their product in the Flat River district, now reaching about 10,000 tons annually, and there is every likelihood that this quantity will be very materially increased next year and the year following. It is also known that the St. Joseph Lead Company are now building a new 1000-ton mill, which may easily carry the united product of the St. Joseph and Doe Run mines to 40,000 tons. It has been thought that the National Lead Company might be pinched for a supply of lead, outside of the American Smelting & Refining Company, but as a matter of fact there are at least 100,000 tons annually obtainable at present outside of the large company. This would include the great bulk of the Missouri lead, a liberal quantity from the California refinery, and an added contribution from the Newark works.

Since our last review the exact figures of the lead production in 1902 have been sent out by the Government. They showed about 280,000 short tons of United States production of lead, being 212,000 of desilverized and about 58,000 of soft Missouri brands, added to which was about 10,000 tons of antimonial lead. There were imported also about 105,000 tons in the shape of bullion, of which 80,000 tons was re-exported. This would leave 25,000 tons of the imported stuff to have been used in this country. In addition to that it was estimated that stocks on hand, January 1, 1902, were 50,000 tons, and December 31, 1902, had been reduced to 10,000 tons. According, therefore, to the United States Government returns the United States Army consumption for 1902 was 335,000 tons. The trade at large could not understand where all this lead could have been used, nor could they figure out the increase, except in the line of electricity. The rough estimates for 1903 are that the strikes cut off about 15,000 tons, and that Missouri made up a part of it, and that slightly diminished consumption just about established an equilibrium. Stocks at the close of 1903 are confessedly down to a minimum.

Referring again to the ambition of the American Smelting & Refining Company to control one of the links in the chain of lead interest, extending from the mines to the final consumer, we may note that the year 1903 has not put them in possession of control in any great preponderance, either as producers or consumers, but it has given them a strong grip at both ends of the line. The most significant development of the year in that line has been the formation of the Federal Mining & Smelting Company, who are backed up by Rockefeller capital, control the chief mines in the Cœur d'Alene district, and bid fair to control the entire product of that district. This concern maintain the most cordial relations with the American Smelting & Refining Company and have already made contracts with them for the working of all their buillion for six years, and may very possibly eventually swing under the same roof with them. Dame Rumor has reported that one of the high officials of the American Smelting & Refining Company has said that in ten years' time the lead business of this country will be a second Standard Oil Company in the perfection of its system and in its earning capacity, as to interest, if not as to volume. This statement lends much color to the belief that the American Smelting & Refining Company will give more than a helping hand to the United Lead Company, and may eventually open the doors of their ample fold and take them in, to become an integral part of the flock.

Another feature of interest to the lead trade has been the matter of the Lovering bill, which provides for such rebates on the lead duties as to facilitate exportation in freer volume in the shape of manufactured goods. The gist of the bill is that consumers may export in made-up goods, pound for pound, against imported lead without the necessity of its being the identical article. To swear to the export of the actual imported material and an honest manufacturer, in accordance with that statement, involves so much extra work in keeping the lead separate and distinct through the whole process of its manufacture that the added cost reduces the business almost below the profit line. The method sought to be permitted, on the other hand, makes the manufacture of the goods much more simple and less expensive and brings absolutely and identically the same revenue to the Government, but serious opposition has been met on the part of one colossal concern, for reasons best known to itself. It is assumed that any company doing enough business to keep a furnace and one or more men steadily occupied on export business can thus make the goods cheaper and be in better position to compete on price than the small man who is forced to manufacture under the present restrictions. The concern which has opposed the law is not directly in lead, but the law is so generic that it extends into all the ramifications of the export trade. Mr. Lovering still claims that there is a fair chance for the passage of the bill this year, but insiders in the trade very much doubt his ability to overcome the force of the opposition.

An item which shows the present capacity for profit, in at least one department of the lead business, is the fact that recently the American Smelting & Refining Company began paying dividends on their common stock at the rate of 5 per cent. per annum. As the value of that stock has ranged for the past six months around between 45 and 50, it makes it an investment at these prices, which is paying about 10 per cent. on the money put in, whereas the preferred stock, ranging between 90 and 95, pays 7 per cent. It is doubtless owing to the black eye, which the common stock of almost every industrial has had, that the public does not trust the chance of the continuance of 6 per cent. on common American Smelting & Refining Company, and leaves it alone, and to remain at such a

low figure. Evidently the white lead branch has not been so lucrative, since the holders of National Lead common are not now on speaking terms, or even a bowing acquaintance, with a dividend. It has, however, been asserted that the manufacturing end of the business will also pay handsomely, when the element of serious competition has been eliminated through further merging.

A bird's eye view of the situation makes it evident that the entire lead trade is following in the line of almost all the other American industries, in its tendency to make the large grow larger and to cause the smaller to shrink.

A Compact Gas Engine, Beam Type.*

BY C. H. MORGAN.†

The student engineer, when told that the work required to lift a weight is identical whether done in a second or a century, accepts the truth with a lingering feeling of a difference existing somewhere, until he learns that difference to be one of power, or the rate of doing work. Then comes he to know time to be a very essence of the world; its root idea, speed—rapidity—dispatch. And so he finds it when coming to the larger activities of life. Time, and the saving of it, the keynote everywhere. Speed—rapidity—dispatch, demanded in mill and office, factory and store. Power comes to have a meaning new and wider than the narrow limits of technical definition. Power to do work well and to do it quickly is the power that controls. Applied alike to men and to machines, it fixes the standard of worth.

Habitual work of back gears, and slow speeds, set aside the old workman for the lad whose quick perception finds the motive that slips the belt to the faster pulley and turns the work out equally well. Halve the time of doing things and a single life may equal two. The dreamer's hope was to lengthen life at the Fountain of Youth. The worker's power doubles life by his working rate. The potency of the thing is in the pulse of all we do. Nor will it brook delay. High speeds and short stops, machines that run through noon hours, mills on double turn, and anything that lessens time and enlarges product. No expense seems too great to pay for it. Durability, reliability, constancy and continuity are at a special premium.

Little wonder, then, that in such an environment the gas engine has been looked upon askance. Its early life a synonym of unreliability. Echoes of its dying gasp as it came to a peaceful standstill; visions of workmen wrestling with the fly wheel to start it anew, are still fresh in the minds of users of power. Yet with all its faults it has gone on steadily from good to better things. The chance of cutting the best known steam engine economies à half or third is a prize too tempting to ignore.

Our esteemed fellow member, H. H. Campbell, in his "Manufacture and Properties of Iron and Steel," facetiously defines the gas engine to be a "cannon with its projectile fastened to a crank shaft." With full appreciation of the delicious humor I cannot but feel that it comes a trifle late. It has been demonstrated at Winnington, England, that a well constructed gas engine giving 114 indicated horse-power can run for 138 days without a stop, and for two years with only 3.4 per cent. of lost time, or 16,931 hours out of a possible 17,520 hours running time, with not a single cam or roller showing signs of heavy wear. The only parts renewed in two years were a set of piston rings, some valve springs and a small ignition valve, while the gas, air and exhaust valves looked as good as new. If that is true the gas engine has either ceased to be a cannon or the projectile has become one of remarkable tractability and docility.

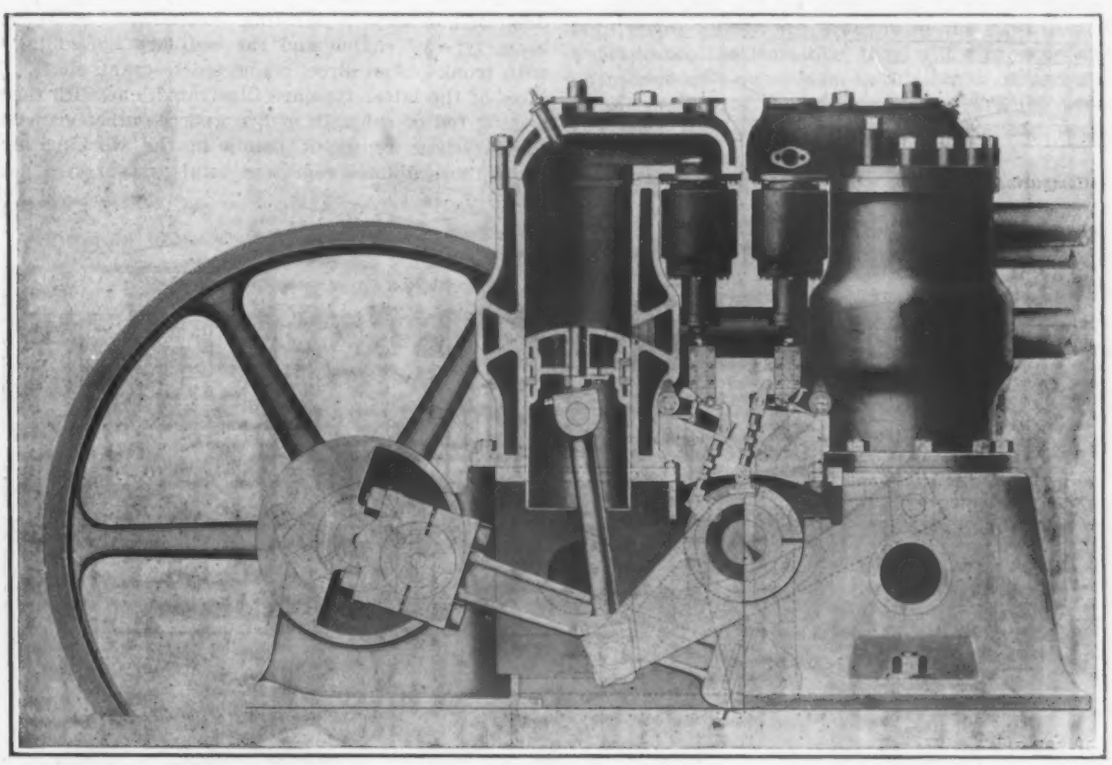

Fig. 1.—Elevation of 1500 Horse-Power Two-Cylinder Engine, Partially in Section.

A COMPACT GAS ENGINE, BEAM TYPE.

It has been the pleasure of the writer to feel something of the possible future of the gas engine and to endeavor to add something to its development and perfection. This has been done collaterally to other and more pressing demands, but always with unabated confidence and interest. In common with others the enormous gaseous wastes of the blast furnace and coke ovens has been a tempting field for research and exploitation. Mr. Campbell strikingly calls attention to the fact that while the blast furnace is primarily a producer of iron, it is a gigantic gas producer as well.

Like the dependence of the steam engine upon its boiler for uniformity and quality of steam, so is that of

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† President Morgan Construction Company and Morgan Spring Company, Worcester, Mass.

the gas engine upon the producer for suitable gas. Nor is such gas easily obtained. Blast furnace and producer gas, especially the former, contain large amounts of dust which comes from the ores, limestone and ash, and which

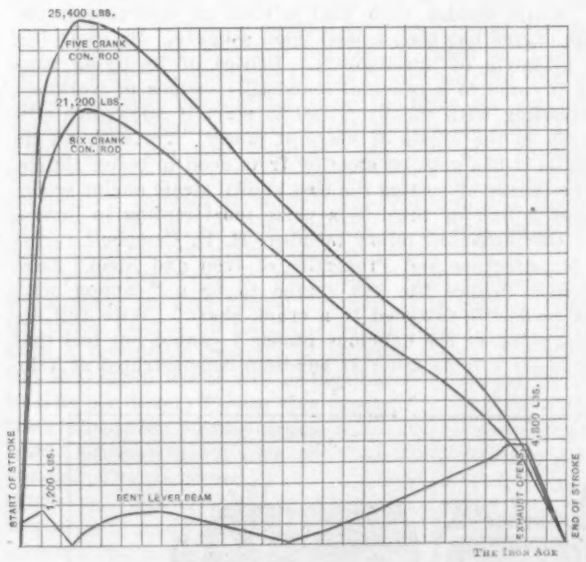


Fig. 2.—Comparing Beam Type with Ordinary Horizontal Types.

The engine has been designed with special reference ciple with an explosion at every downward stroke of the piston. Two compressors, one for gas and one for air, furnish the engine with its charges of gas and air, and provide air for scavenging. The exhaust is through ports in the cylinder, which are uncovered by the piston near the end of its downward stroke; thus avoiding the use of water ceoled exhaust valves and the mechanism which would be required to operate them. It can also be operated on the four-cycle system by slight changes.

The engine has been designed with special reference to the use of blast furnace and producer gases. The working beam type of engine and bent lever beam have been chosen for the following reasons: It allows the cylinders to be placed upright, balancing the pistons and their connecting rods; it subjects the cylinder walls to much less pressure from the pistons, reducing the friction to a minimum.

During the first half of the working stroke the average pressure of the piston on the walls of the cylinder is 100 pounds per square foot of surface. Fig. 2 shows diagrammatically a striking comparison between the beam type of engine and the ordinary horizontal type with trunk piston direct connected to crank shaft. Two cases of the latter type are illustrated, one with the connecting rod of a length of five and the other six cranks. The abscissæ represent points in the working stroke, while the ordinates represent total pressures in pounds

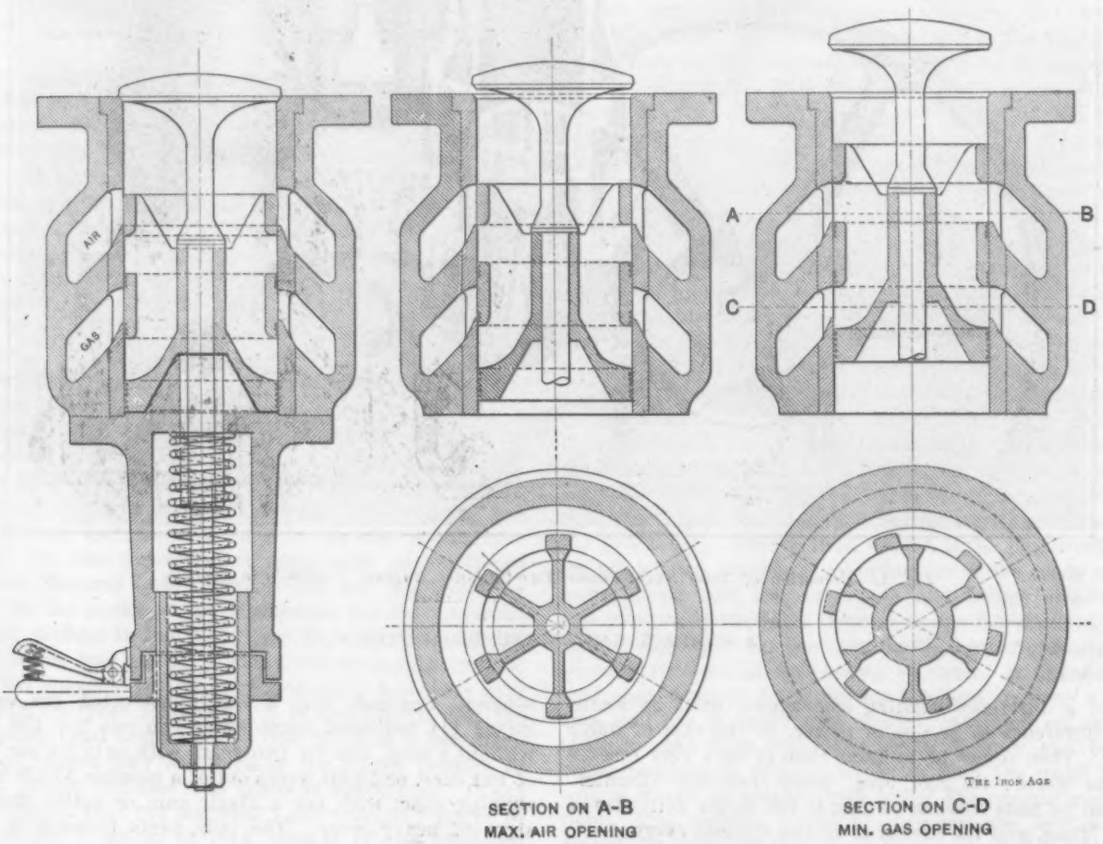


Fig. 3.—Sections of Inlet Valve in Three Characteristic Positions.

A COMPACT GAS ENGINE, BEAM TYPE.

is driven out with the blast. This dust has been the *bête noire* of the gas engineer in attempted utilization of the gas, clogging the checker work and flues when used for reheating, impeding combustion when burned under boilers, and cutting and grinding vital parts of the machine when used in gas engines. Various devices for washing or eliminating the dust had been devised, when, in the year 1900, German engineers discovered the value of passing the gas through a simple centrifugal fan blower injected with a small spray of water. The result has been exceedingly promising, and when perfected will doubtless solve the troublesome problem.

on the cylinder wall due to the angularity of the connecting rods. The distance between each of the horizontal cross lines is equivalent to 1000 pounds, and the distance between the vertical cross lines to 2 inches of piston stroke.

The bent lever beam also gives us the least pressure against the walls of the cylinder during that part of the working stroke when there is the highest speed of the piston, and also facilitates the lubrication of the piston and the piston connecting rod pins.

The John Cockerill Company of Seraing, Belgium, who were pioneers in the construction of large gas engines

using blast furnace gas, purpose exhibiting a 3000 horse-power gas engine at the St. Louis Exposition in 1904. An official statement gives the floor space to be occupied by this engine as 45 x 85 feet (3825 square feet). A pair of engines of the beam type arranged for blast furnace duty with a capacity of 3000 brake horse-power, although of the same power as the Cockerill engine, require a space of only 24 x 32 feet (768 square feet), one-fifth of the space.

Each of the inlet valves of the engine is a combination of the mushroom or poppet valve and cylindrical valves with ports for gas and air, all the valves being arranged on one stem. The cylindrical valves have radial partitions which facilitate the mixture of gas and air before entering the cylinder, thus securing prompt ignition at the first part of the working stroke and a corresponding high efficiency. The air ports and poppet valves are opened in advance of the gas ports, so as to thoroughly scavenge the cylinder. Fig. 3 shows the inlet valve in section in three characteristic positions. The left hand figure represents the valve closed, the central figure in a scavenging position and the right hand figure the position of the valve when fully open. The proportion of gas and air can be varied while the engine is running by rotating the valve slightly upon its axis by means of the handle shown in the illustration.

The valve gear is of the releasing or Corliss type, with dash pots to secure quiet closing. The valve gear is operated directly from the working beam without eccentrics or cams, which reduces the lubrication and care usually required in steam and gas engines. Fig. 4 shows the valve gear as adapted for use in a two-cylinder engine. The piston of the left hand cylinder has completed its downward stroke, the scavenge lever during the latter part of this stroke has raised the valve to the position shown in the illustration, which allows the trigger to engage with the valve slide and continue the raising of the valve, opening the gas ports as the piston starts on its upward stroke.

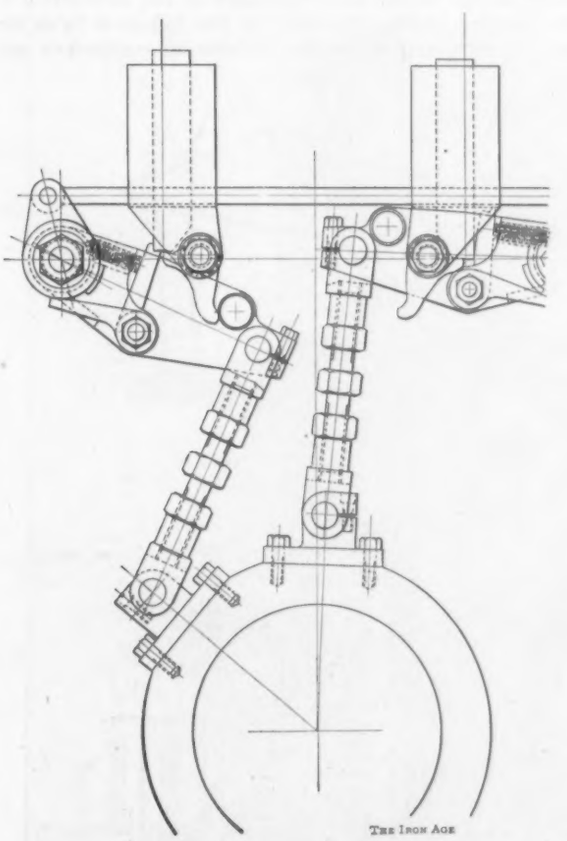


Fig. 4.—Valve Gear for Two-Cylinder Engine.

This trigger is under direct control of the governor, which effects through its connections the tripping of this trigger at varying points in the stroke, as determined by the load on the engine. This tripping allows the valve to return to its seat, the dash pot preventing any shock due to closing. The right hand valve gear is shown in its highest position, the trigger having been tripped by the action of the governor.

Each cylinder of the engine is provided with two ignition or spark plugs, so that in case of failure the current can be switched from one to the other without stopping the engine. The timing of the ignition, so that the spark may come before passing the center, at the center, or at any required part of the working stroke, is accomplished by a movable disk, which can be changed instantly to any required position when the engine is running at full speed.

Fig. 5 is a connection diagram for a beam and a direct connected type of engine. It shows the amount of angularity of the connecting rods and the points in the stroke at which the angularity is a maximum.

These, then, are the lines along which my efforts have been made. They are brought to the attention of the society with the hope that they will give some measure of interest and enthusiasm in this highly important field. If the wastes of the old generation are the profits of the new, then large dividends are waiting us in the squandering of the past. The fearful wastes of blast and coke furnaces, the enormous power in them awaiting capture and control must impress any one at all sensitive to manufacturing economies. May this new motor assist in bringing quick subjection, harness a new and better power for the wants of man, and so obey the divine command "to subdue and have dominion." In closing, the author desires to express his thanks to his assistant, A. J. Gifford.

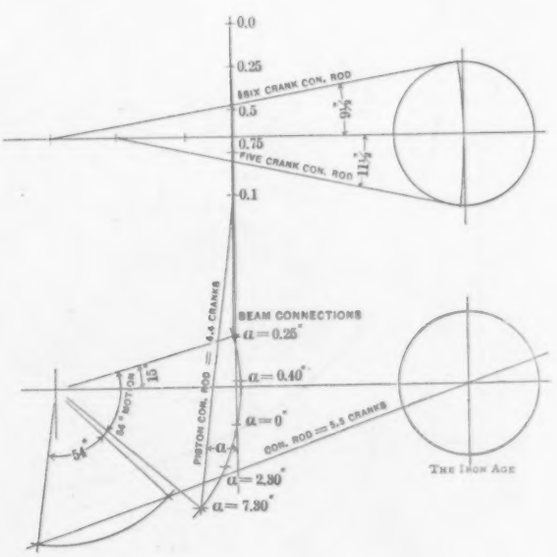


Fig. 5.—Connection Diagrams for Beam and Direct Types.

A COMPACT GAS ENGINE—BEAM TYPE.

The latest form of railway tie is made of leather. The scrap leather from shoe shops is taken into a disintegrator, ground very fine, subjected to a refining process, and molded. The tension of the molding machine can be so regulated that ties hard enough to take a spike, or ties through which a spike cannot be driven, can be produced. The three great essentials in a cross tie are apparently found in this leather sleeper, for it is guaranteed to hold a spike, the fish plate will not splinter in it, and it will not rot. Sample ties put down 28 months ago in the West Springfield freight yard of the Boston & Albany road do not show the least wear.

Central Condensing Systems.

BY LOUIS R. ALBERGER, NEW YORK.

The central system of condensation is the natural outcome of the growth in the size of steam power stations and the increase in the number of engine units in a single plant. A central condensing plant may be considered to bear the same general relation to a station as do the steam boilers with their loop system of steam piping. It cannot be doubted that engineers would be glad to reduce the number of boilers in a large battery if the greater size of the individual boiler was not made prohibitive by conditions of firing and of strength of materials affected by enlarged diameters and others equally as rigid. Still, it is no more necessary to set apart for each engine its special boiler, stack and feed pump than it is to employ a separate condensing apparatus for each engine. It is quite needless to say to those who are familiar with the management of blast furnaces and steel mills that reliability in the engines and their attachments is of the first consideration, and they are often used as non-condensing engines, greatly to the loss of economy, because of the fear that independent condensers for each engine would add so many parts that the plant might become unreliable. A number of instances may be cited where blowing engines have been supplied with condensers and air pumps, which had as many moving parts as the main engines. These parts, while, of course, of comparatively small size, still require adjustment and renewal for wear, and in a blowing engine house or a steel mill containing several units this attention amounts to a very considerable portion of the total.

Combining the exhaust steam from several units into one condenser, of course, requires a condenser of enlarged proportions, and this increase in size of the condensing apparatus permits of the use of a higher class of machinery and accomplishes a great reduction in the care and attention that must be given to independent condensers applied to each engine in the power house. It was at first urged that it would not be wise to rely to such an extent upon one condenser, but experience has shown that the greater reliability and safety of the central condenser overbalance any such objection. Of course in extremely large installations the pumps serving the condenser may be duplicated, so as to insure continuous service if the latter is demanded.

It is the increase in size of condensers that has caused the development in recent years of what is known as the barometric condenser, employing a dry vacuum pump. In small condensers the practice of pumping both the air and water with one pump has been based upon simplicity and reduced first cost, rather than upon lines of best results. With a central condenser, however, the requirements of large quantities of water and air to be pumped make it desirable and economical to provide pumps especially intended to handle each fluid. The water circulating pumps can be of the best design and can be constructed to suit the conditions of the locality or the character of the water, without regard to the production of the vacuum in the condenser or the influence upon the suction lift that ordinarily pertains to condensers and air pumps in which the injection water is lifted by the vacuum in the condenser. This separation of the pumps is of very great importance, because many of our sources of water supply yield water containing sand, grit and other foreign material that require pumps with outside packed plungers and which would be entirely unsuitable for use as air pumps. The use of the barometric condenser and of separate pumps permits the water pump to be placed at any convenient position, provided it is within proper suction distance of the water supply.

The principal characteristic of the barometric condenser is the barometric column, upon which the condensing chamber itself is placed, some 34 feet above the hot well. The function of this barometric column or tail pipe is to allow the water which has produced the condensation in the condenser to flow out by gravity against the pressure of the atmosphere. If the water supply is within 20 feet of the opening into the condenser, the vacuum in the latter will lift the water, and no circulating pump will be required. In Fig. 3 is shown a barometric condenser, in which the water is sprayed by an automatic spray cone, so that it is brought into intimate contact with the ex-

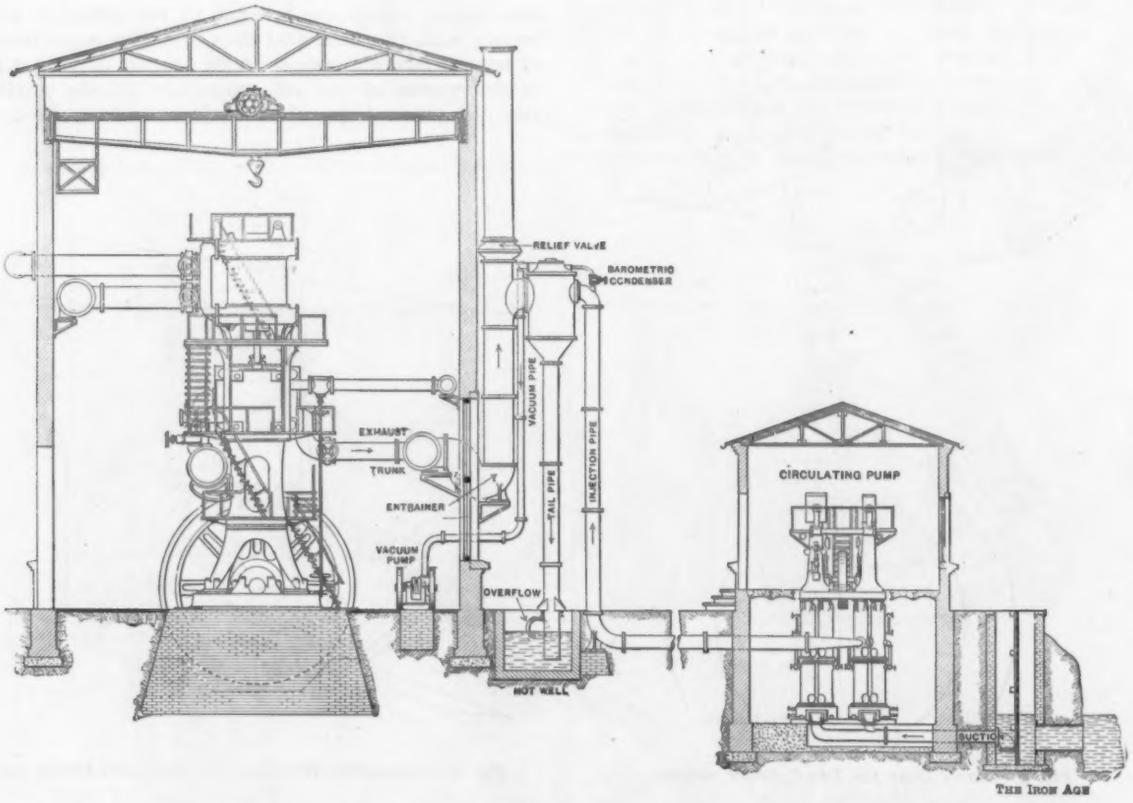


Fig. 1.—Cross Section Showing Central Barometric Condenser System as Applied to a Blowing Engine Plant.

CENTRAL CONDENSING SYSTEMS.

haust steam to be condensed. After producing condensation the heated water falls into the lower part of the chamber, where it is again brought in contact with incoming steam by means of the annular space between the inner cylinder and the shell of the condenser. The subdivision of the water and its intimate contact with the steam entangles a considerable portion of the air and uncondensable vapors and carries them down with it through the tail pipe into the hot well. The air which is not carried down passes up through the tubular support of the spray cone and comes in contact with cool injection water in the air cooler at the upper part of the condenser. This air cooler consists of plates, over which a small portion of the cold circulating water passes; the object of the air cooler is to reduce the temperature of the air, so that it will be in the best condition to be pumped by the dry vacuum pump. Surrounding the air cooler is a separating space to allow the removal of any entrained moisture before the air goes to the dry vacuum pump.

In installations where the exhaust piping has been put together with proper precaution and the amount of air leakage is normal, it has been found that the circulating water will carry off by induction a large portion of the air, and the condenser can be operated with a vacuum often as high as 20 inches of mercury when the vacuum pump is disconnected. This ability to operate without the vacuum pump is very satisfactory in case of overhauling, as the engines can still be run condensing although under a somewhat lesser degree of vacuum.

The object of the automatic spray valve is to guarantee a proper distribution of the water at all times, even when but a small quantity is flowing. It often occurs in electric lighting plants that during several hours of the day the load is light and it becomes desirable to reduce the amount of circulating water. If the adjustment of the spray valve is performed by hand, it is liable to be neglected or forgotten and full effect of the water is not obtained. The result accomplished by this automatic device is that in a central condensing equipment the amount of circulating water required depends entirely upon the amount of steam to be condensed and the speed of the vacuum pump depends upon the amount of air to be removed from the system, so that under various conditions the highest results can be obtained.

The cross section, Fig. 1, shows the end view of a blowing engine-house arranged with a barometric condenser placed just outside the wall of the building and supported upon its tail pipe. The circulating pump is adjacent to the water supply and is of a form that is par-

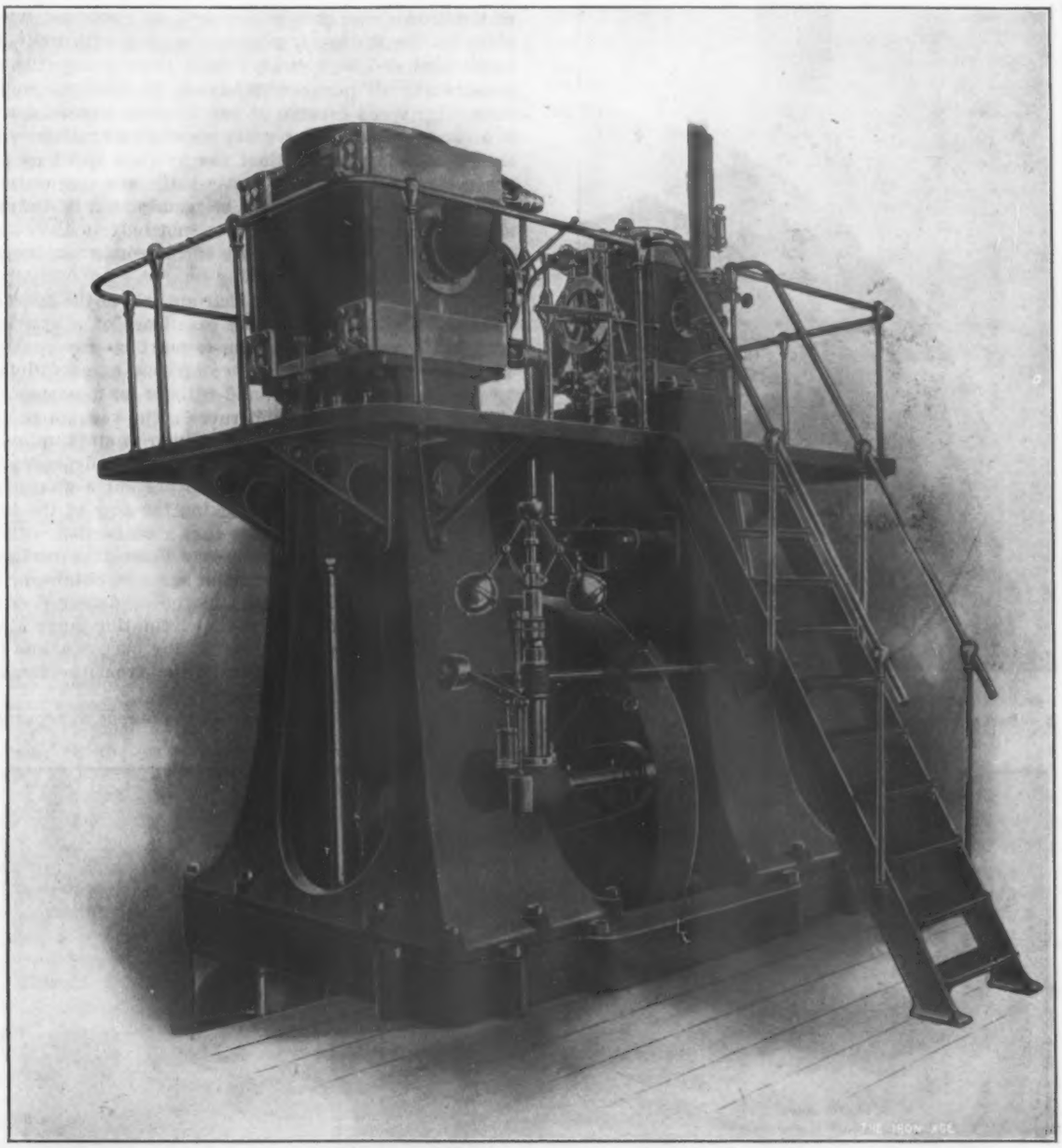


Fig. 2.—Vertical Corliss Circulating Pump.

CENTRAL CONDENSING SYSTEMS.

ticularly suitable for situations where the level of the water is liable to vary to a considerable extent during different periods of the year. This circulating pump is of the outside packed plunger form, driven by a vertical cross compound Corliss steam engine, the latter being shown more clearly by Fig. 2. It will be seen that the circulating pump discharges into the barometric condenser, and while the load upon the circulating pump varies according to the degree of vacuum in the condenser, being greatly assisted during the times of regular operation, still the suction of the circulating pump is in no way affected, and even a complete loss of vacuum in the condenser will not cause a loss of suction to the circulating pump. This is of great importance in case of over-load upon the engines, at which time the vacuum may temporarily fall in the condenser, but will recover itself when the over-load is reduced, and this is accomplished without any danger of complete loss of vacuum and the very disagreeable results that sometimes occur when engines are thrown suddenly from condensing to complete non-condensing conditions.

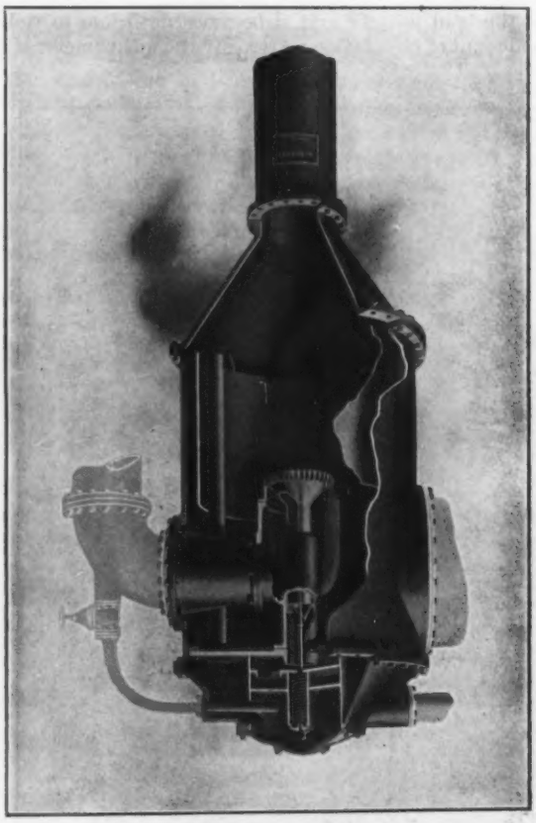


Fig. 3.—Barometric Condenser, Showing Details of Construction.

In the case of a central condenser applied to engines under varying loads, in which the individual engines at times carry over-loads that are not usually coincident, it will be found that the central condenser can be operated to take care of the average total load of all the engines, and with a great gain in economy as compared with a plant having the same engines equipped with individual condensers and air pumps. With these latter, the condensers and air pumps will have to be operated continuously at a speed capable of handling the over-load when it occurs, so that their regular speed of operation will be the over-load speed and not the average speed as with the central condenser. As over-loads are frequently as great as 100 per cent., it will be readily seen that a great saving is made in this direction, not only in the cost of operation but also in the cost of the condenser installation.

There is another feature that appeals to the operating engineer who appreciates the excellence of a system of condensation that enables him to start up any engine in the station in as short a space of time as conditions of "warming up" will allow, and without for a moment considering the condensing apparatus. The vacuum is there ready for him. There is no air pump to start up, no injection valve to open as in the case of an independent jet condenser, no care to be taken to prevent a gulp of air breaking the vacuum and checking the flow of the injection and heat the pump up so that a connection with the service water supply is necessary before the condenser can be cooled off and the vacuum again be obtained.

The fact that the vacuum in the condenser does not affect the supply of water to the circulating pump allows the use of warm water for condensing purposes, and it is now quite general to use bosh water from the furnaces where it can conveniently be obtained.

The benefits of the division of the pumps to separately handle air and water apply to the vacuum pump quite as effectively as they do to the circulating pump. The increased demands upon the vacuum pump by exhausting several engines into one condenser, permits the use of a vacuum pump of high efficiency, built very much on the lines of the modern air compressor, except that certain

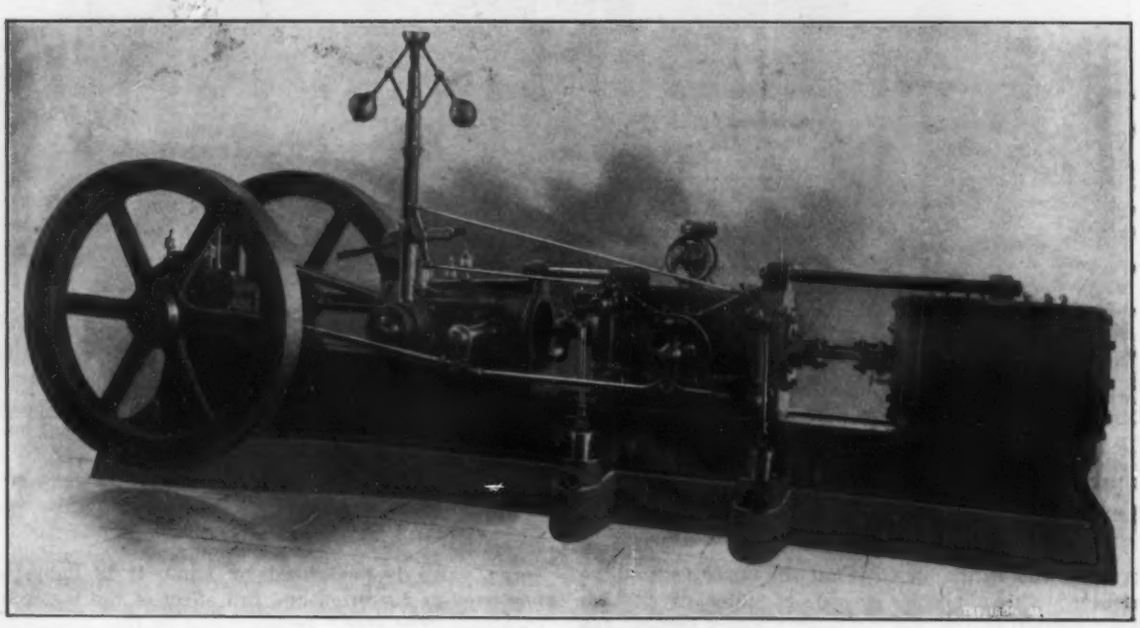


Fig 4.—Corliss Type of Dry Vacuum Pump.

CENTRAL CONDENSING SYSTEMS.

modifications are made to suit the low initial pressure, and in order that there may be no retardation to the flow of the attenuated air from the condenser to the cylinder of the vacuum pump, the inlet valves are mechanically controlled so as to open ports entirely free from restrictions.

A self contained machine of this kind is illustrated by Fig. 4, the steam cylinder being provided with Corliss valve motion and automatic governor. The particular pump shown is one that is used with condensers having a capacity of about 150,000 pounds of steam per hour, and has a vacuum cylinder 24 inches in diameter by 24 inches in stroke. It is not generally understood that the load upon a vacuum pump is greatest when the vacuum is about 19 inches of mercury, and is at this time from three to four times greater than when running under normal conditions of 25 to 27 inches of mercury. This fact makes a Corliss valve motion particularly well adapted, because while it may run at long periods under the normal and comparatively early cut off, with resultant economy, the governor stands ready at any instant to change the point of cut off if the vacuum should fall in the condenser, and even to take steam for one-half of the stroke under the condition of extreme load as above stated. The governor is provided with a hand adjustment by which the speed can be changed while running at any determined rate.

While the above comparisons have been made more particularly between central and individual condensers, it will be evident to those who have followed recent engineering practice in large electrical power plants that there are many ways in which the barometric condenser recommends itself for use, as an individual condenser with the extremely large engines that are now being operated.

Patterson Steam Separator and Oil Extractor.

Construction of the Patterson separator and the principles upon which it operates may be seen from the sectional view given in the illustration. Direction of motion of the passing steam is indicated by the arrows. The current entering from the right is opposed in its direct passage through by a diaphragm of the peculiar form shown. By the peculiarly curved shape at the inlet the stream of steam is positively, yet not abruptly, deflected downward to reach the opening through the partition wall on its way to the outlet. Placed vertically upon the inner walls of the chambers at either side of the partition are ribs extending out about in line with the sides of the opening through the plate.

As the entering steam is deflected from its straight direction of flow, the entrained moisture brought in as suspended particles is, by its greater inertia, cast upon the deflector and flows thence to the side walls and downward to the receiver space at the bottom of the chamber. Liquid flowing in along the bottom of the pipe falls directly to the receiver space. For the moisture not cast upon the deflector as the steam is turned downward further opportunity for separation is provided by the whip snapping action as the steam passes through the partition on its way to the outlet. The vertical ribs at both sides of the chambers serve a double purpose. They have a "scrubbing" action upon the steam, and are thus effective to a considerable extent in removal of moisture from the current. They also serve to catch and retain moisture cast upon them, and guide all separated liquid directly downward to the receiver space, reducing possibility of its being picked up again and carried along out with the steam. The partition is carried well down into the receiver space, there acting to quiet the entrapped liquid and prevent excessive disturbance under the influence of the passing steam. Agitation of an excessive accumulation of liquid in the receiver space under the influence of the passing steam would introduce the liability to entrainment of certain portions of the liquid and a corresponding reduction of the efficiency of the separator.

The curvature of the deflector is of the "transition" form, which causes a gradually increased rate of deflection of the steam. Thus spattering of liquid back into the current is avoided. The makers state that all areas have been carefully proportioned to prevent reduction of pressure by throttling. The areas of all passages are stated to be fully twice that of the steam pipe to which the separator is fitted. The reduced velocity due to this increased area has an influence of recognized value on the efficiency of separation.

Vertical patterns of the Patterson separator are made, as well as the horizontal form here shown. Both patterns are provided with large hand holes for giving convenient access to the interiors for cleaning. Each separator is stated to be tested to 400 pounds hydraulic pressure, and supplied with gauge glass and companion flanges. The guaranteed efficiency for the separator is that the leaving steam shall not contain more than 0.5 per cent. of moisture, provided the entering stream does not carry more than 10 per cent.; with 20 per cent. of entrainment entering the separator, the leaving steam shall be 99 per cent. dry—always providing, of course, that the separator is not unreasonably overloaded and is kept properly drained from the bottom of the receiver space.

PATTERSON STEAM SEPARATOR AND OIL EXTRACTOR.

The separator is put forth as a device adapted equally well to use on high pressure steam mains for removal of water from live steam and to employment as an oil eliminator on exhaust pipes. The makers are Frank L. Patterson & Co., 26 Cortlandt street, New York.

The mercury vapor electric lamp of Peter Cooper Hewitt is rapidly coming into popular use in several of the Eastern cities. It is appearing in factories, composing rooms, warehouses and other places where great accuracy of vision is required. One of the advantages of the light is that it makes use of a current of high voltage, yet gives a steady illumination, where with another system the effect would be almost blinding. On account of the absence of red rays, it is easy on the eyes, and is well adapted to the use of those who work at night, provided their tasks have nothing to do with fine discriminations between colors.

In France every freighting and market cart, instead of injuring the highway, improves it. Many of the tires are 10 inches wide. In the four-wheeled vehicles in that country the rear axle is about 1 foot longer than the forward axle, and as a result the rear wheels run in a line considerably outside that produced by the front wheels. After a few loaded wagons have passed over the road it looks as if a steam roller had been at work on it. A national law in Germany provides that wagons heavily loaded must have tires not less than 4 inches wide. In Austria the minimum for similar vehicles is 6½ inches; in Switzerland, 6 inches.

Problems in the Designing of Large Steam Units.

BY CONSERVATIVE.

Some of the recent developments in the steam plant requirements in this country have occasioned much discussion among mechanical engineers and the manufacturers of the various kinds of apparatus called for in recent specifications. It is always dangerous to the peace of mind of a writer to sound a cry of warning against going too fast in the development of modern methods, but it seems as though it is becoming more and more necessary to point out a few rather important limitations in certain kinds of apparatus before some of the recent errors become chronic.

It is somewhat astounding to compare the modern power stations with those of only ten years ago, when a 5000 horse-power plant was more rare than one ten times as large is nowadays. This call for large amounts of power from central stations has naturally been followed by the development of enormous units in engines and turbines, and also the demand for superheaters and large boiler units. In order to get the maximum of electrical output per square foot of real estate these large engines and turbines have developed vertically rather than horizontally, as real estate in large cities is costly. While such development of the engines has taken place, it has been followed in the boiler plant by the increase in the size of the units and the introduction of two-story boiler houses with their attendant evils. It is more especially in relation to boilers and superheaters that this article has to do, and in order to illustrate the matter we will use a few figures.

If we take the measure of boiler power as the grate and the amount of coal that can be burned per square foot on it, we can get some idea of the amount of floor space required to install a given amount of boiler power, as it is manifestly absurd to place a large amount of boiler heating surface over a small grate, divide this heating surface by some empirical number of square feet of heating surface per horse-power and feel satisfied that the boiler horse-power has been determined, when actual facts will prove that not enough coal can be burned to make more than one-half or two-thirds of the heating surface available.

To make this clear, if we assume that 6 feet is the extreme depth of a grate which should be used for soft coal for hand firing, that for ordinary running under natural draft 21 pounds of coal is a fair amount of such coal to burn per square foot, and that 3½ pounds of good coal will produce a boiler horse-power, we find that a furnace 1 foot wide and 6 feet long will burn 126 pounds of coal per hour and produce 36 horse-power. As all modern boilers should be capable of being forced 50 per cent. above rating, if the same economy is assumed, the forcing capacity per square foot of the grate is 31½ pounds of coal, and the horse-power per foot width of furnace is 54. But modern plants have practically relegated hand firing to obsolete practice, and stokers or automatic firing have taken its place. While stokers cannot probably burn much more coal per square foot of grate than the ordinary flat grate, it is possible without making them excessively deep to increase the amount of grate surface per foot width of furnace, and if we assume that this increase is 20 per cent., we get 43.2 horse-power per foot width of furnace for normal running and 64.8 horse-power per foot width for forcing. It seems, therefore, clear that there is a relation between the width of the furnace and the horse-power desired for the boiler. Until the last few years a 250 horse-power boiler was considered a large unit, and a fair average furnace for this boiler was 7 feet wide, or, using our figures for hand firing, $7 \times 36 = 252$ horse-power, this showing a good proportion. Then the demand came for 500 horse-power boilers, and manufacturers increased the heating surface 100 per cent. over their 250 horse-power boilers, but only increased the grate surface from 50 to 75 per cent., or, say, from 10.5 to 12.25 feet for the width of a furnace of a 500 horse-power boiler. With hand firing on the above basis we get:

$$10.5 \times 36 = 378 \text{ horse-power.}$$
$$12.25 \times 36 = 441 \text{ horse-power.}$$

thus showing that it was not reasonable to expect these large units to have the forcing capacity that the smaller units had, and many large boiler installations have developed this very defect. The stokers, however, corrected this lack of grate capacity in many cases, and if we take the larger grate mentioned above and add 20 per cent. to it for stoker increase we get 529 horse-power as a fair value for such a furnace; but the good judgment of asking such a furnace to take care of a 625 horse-power boiler, as has recently been done rather commonly, is to be questioned.

Designers are responsible for this stretching of the supposed value of a foot width of furnace, owing to their endeavors to put as much boiler power as possible on a given piece of real estate, but this imaginary extra value of a foot width of furnace under the large units over its value under the smaller ones might better be a real value in extra width when it comes to a balance between the boiler and engine power of a large station.

As a result of very recent developments, boiler manufacturers are now facing demands of the mechanical engineers which call for the production of even larger units, 800 to 1000 horse-power per boiler being specified, and it is possible that there will be a still further imaginary value placed on a foot of furnace width in order to meet such demands and apparently install more horse-power per square foot of real estate than has ever yet been done. Let us hope that such will not be the case, as there is at present too wide a divergence between the heat producing capacity of the grate and the heat absorbing capacity of the boiler. But where are the stoker or furnace manufacturers to land in this large unit problem? It is conceded that an arch 12 feet or a little more is the maximum for a stoker furnace. Larger units mean double arches for a furnace and an intermediate wall to support the stokers, and it is a grave matter of doubt as to how satisfactorily a fire 20 or 25 feet wide can be handled, and whether the limit of the width has not already been reached. It seems comparatively simple for the boiler manufacturers to supply the large units, but it appears that the stoker manufacturers will be facing a very serious problem.

In relation to the matter of superheaters, which are being so much specified, there are a few facts which, taken in connection with what has been said above, seem to be worth considering. Recent specifications have called for boilers for 200 pounds working pressure having superheaters with them capable of superheating steam at 200 pounds pressure 200 degrees, these superheaters to be placed in the boiler setting and receive their heat from the gases which come from the boiler furnace. To get back to figures, let us take an example of a 500 horse-power boiler receiving feed water at 200 degrees and furnishing steam at 200 pounds pressure, with a superheater to increase the temperature of the steam 200 degrees. Then we have $\frac{500 \times 34.5}{1.067} = 16{,}167$ pounds of steam per hour, evaporated from 200 degrees F. into steam at 200 pounds pressure, and at 3½ pounds of coal per horse-power per hour we have consumed 1750 pounds of coal. A superheater requires one British thermal unit to heat a pound of steam 2 degrees; therefore, $16{,}167 \times 200 \times ½ = 1{,}616{,}700$ British thermal units are needed to superheat this amount of steam 200 degrees. If we assume coal having 13,500 British thermal units per pound and that the superheater absorbs 70 per cent. of this heat, we have

$$\frac{1{,}616{,}700}{\frac{70}{100} \times 13{,}500} = 171 \text{ pounds of coal,}$$

or about 10 per cent. more coal to be burned. It has been shown that as the units of boilers are increased in size the grates become relatively small, and, therefore, the furnaces are being pushed to the extreme limit to furnish enough heat for the boilers. Therefore, the practice must be condemned of requiring the already overtaxed furnaces to furnish enough heat to superheat the

steam. The solution of this difficulty is, of course, separately fired superheaters, and it may be confidently predicted that they will be widely used to the exclusion of superheaters inside of the boiler setting. They are under much better control and some recent examples have shown an astounding efficiency and remarkably low exit temperature of the gases. Here again the designer will cry for his real estate and say they take up too much room, but the advice is justified to give the boilers sufficient room for the necessary grate surface and find room for the superheaters. Coal will have to be burned to superheat the steam, and putting the superheaters out of sight in the boiler setting does not eliminate this fact and does produce a condition of affairs in that setting that will increase the gray hairs in the head of the superintendent of the power plant.

Recent Progress in Cylindrical Grinding.

BY C. H. NORTON, WORCESTER, MASS.

Cylindrical grinding as a process in machine and tool making is old. Probably no one can give its age, but it did not become generally known until the introduction of the Brown & Sharpe Universal grinding machine, in the early seventies. For 15 years after the introduction of this machine the popular belief was that cylindrical grinding was practical only for hardened work. For the last ten years there has been an awakening to the fact that all cylindrical work that revolves on two centers can be produced most accurately and economically by grinding. It is principally in the last two years that the cylindrical grinding machine has come to the measure of a full grown machine tool and has taken its place with the lathe as a necessity for the rapid production of the most common shafts, as well as the more accurate spindles and rolls.

It is during the year just past that some of the most important strides have been made. One of the first in importance is the practical demonstration of the fact that the grinding machine must be heavy and powerful to produce even small work economically. We have learned that instead of using an 8-inch swing machine to grind work 6 inches in diameter, we need a 12-inch machine in which to grind work from 1 to 2 inches in diameter most economically, and that a grinding machine will produce good work in proportion to its weight, provided the right wheel is selected for the machine and work.

We have learned that differently designed machines require different wheels for the same work; that wide faced wheels with a cut of their full width at each revolution of the work are most economical; that wheels less than 18 inches in diameter are of little value compared with larger ones, and that coarse wheels can be so used as to cut off stock rapidly and also produce a good finish on the work.

During the year just past there has been going on a thorough study of the relation of work speed and of wheels, and the speed has changed from 80 to 100 feet per minute of work to a speed of from 6 to 35 feet. With this has also come a change in wheels from No. 80 grade M and N to No. 36 grade L for the same work, with a very great increase in quantity and quality of work.

The steady rest has become a very important feature for all work. Springs have been abandoned, and every effort is now made to produce a perfectly rigid support for the work. The quality of wheels has been largely increased.

A great amount of study is being given to produce wheels to suit the different kinds of work and the machine on which they are to be used. Heavier machines have been made during the last year than were ever attempted before. It is now wholly practicable to grind work weighing 7000 pounds on centers and to produce it to a limit of one-quarter thousandth of an inch. Within the last two years it has become common with many shops to grind 1-32 inch from the diameter of work in shorter time than was formerly required to grind off 0.006 or 0.008 inch. Now grinding is done from the most crude turning, and perfect work is obtained at a great saving of cost over the old methods.

In connection with the development of power and weight of the grinding machine, we have found that work that was formerly ground with machines weighing about 3000 pounds can now be produced more economically with a machine weighing not less than 9000 pounds.

While water has been used for many years, it is not until the last two years that we have known its true value. Modern machines are arranged to use a maximum of 40 gallons per minute. To water is added soda and oil. The water serves to carry away the heat, the soda prevents rusting of the finished work and the oil increases the life of the cutting edges of the wheel as surely as it does the cutting edges of a milling cutter.

An important discovery of the last two years in connection with steadying the work in order to grind more rapidly without vibrations is that any cylindrical work revolving on centers, whatever its length and regardless of its errors from roundness, can be ground perfectly round by supporting it with rigid steady rests in firm contact with the irregular shape; or, in other words, that a bearing or other portion of any work can be ground perfectly round while running in a rigid support on itself. This discovery has opened the way to rapid production of very slender work, and has greatly decreased the time required for all work; for all kinds of work are now ground with rigid rests, whether it be large or small, short or long.

The last year has developed machines, wheels and methods of doing work which enable the grinding of material at the rate of 1 cubic inch per minute from the diameter of round work with the consumption of less power than was required to remove ½ cubic inch two years ago. The last year has seen the introduction of powerful machines for grinding locomotive piston rods for repairs without re-turning, in from one-sixth to one-eighth of the time required when done in the lathe. These are ground with the heads in place. Very heavy machines have also been introduced in marine work, machines which take work up to 7000 pounds on centers and 14 feet long. A number of these are now at work on the Clyde and in England, and a few in this country. Printing press work is now done on heavy machines of this type.

The introduction of the plain grinding machine about six years ago opened the way to real commercial grinding as distinguished from special and tool work grinding; but it is in the year just past that the superiority of the "plain" machine has been fully understood.

Now the difference between a universal and a plain machine is understood by most mechanics, but for several years all grinding machines were called "universal grinders," and the possibilities of the "plain machine" were judged from experience with universal machines, a very much mistaken judgment, that is now realized; and plain machines of rugged proportions, so designed as to perform their work continuously and accurately when operated by rough and ready men in the every day work of heavy hustling shops, are now at work in representative shops both in this country and abroad.

The best "plain machines" of to-day are so constructed that rapid and accurate work is done by ordinarily intelligent men without the necessity for fussy, patience trying methods so common with universal grinding of the past. Within the year the plain grinding machine has been placed on a footing with the latest rapid reduction lathes, and is now a fit companion of the best lathes to round out the full usefulness of modern high speed steels. In may interest the reader to know that cylindrical grinding is now done in many shops in a way that shows a saving of from 25 to 75 per cent. in the total time of producing round work, for with the modern grinding machine much is saved in turning when the size and finish is to be produced by grinding.

An interesting fact in connection with the progress of cylindrical grinding is that it has been so rapid that many do not yet know that it is done at all, and when told of what is being accomplished regard it as the story of a mistaken enthusiast, and often this is the fact when it is in successful operation in the shop of their neighbor.

A New Line of Electric Traveling Cranes.

In placing upon the market a complete new line of cranes of various types, the Case Mfg. Company of Columbus, Ohio, are introducing a number of novel and interesting features which are fundamental in the construction of their electric traveling cranes, and form a nucleus around which several special types of electric cranes are designed.

One of the special types which is of interest to steel manufacturers is the form of ingot crane illustrated in Figs. 1 to 4, inclusive. This crane is in operation at the Cleveland plant of the American Steel & Wire Company. As this crane is so designed as to occupy but 10 feet above the runway rail, it has the especial advantage that it can be installed in a building constructed with a limited amount of head room. The bridge is of the same construction as is employed in the standard type of traveler, as described later.

The trolley is radically different, however, and particularly as far as the hoisting, rotating and tongs operating mechanisms are concerned. The upper part of the trolley is mounted upon a rotating frame, which enables the operator to pick up an ingot standing at any angle. The construction of this trolley is illustrated in Figs. 2, 3 and 4. The mechanism provided for rotating the frame is plainly shown in Fig. 2. It will be observed that a worm on the end of the armature shaft of the motor is in mesh with a worm wheel mounted on top of a vertical shaft, the bearing of which is a part of the upper frame. On the lower end of the shaft there is a spur pinion, the teeth of which engage in the circular rack on the lower portion of the frame. Large steel balls running in circular grooves immediately above the circular rack furnish a bearing which enables the upper frame, with its mechanism, to be revolved with great ease of operation and under excellent control. The chains suspending the tongs are so hung as to insure uniform rotation of the tongs with the upper frame of the trolley.

The hoisting and lowering mechanism, which is illustrated in Fig. 3, consists of two drums, upon which the chains are wound, driven by a special motor. The transmission of power, it will be noted, is by means of spur gearing. A friction band brake operated by a solenoid is attached to the rear end of the armature shaft of the motor.

For the purpose of opening and closing the tongs there is another drum. This operation is also actuated by means of a solenoid, which is shown in Fig. 4. In this engraving the electrical connections are also shown.

All of the operations in connection with the manipulation of these functions of the trolley are under control of the operator, as well as the movement of the crane itself along its runways and the movement of the trolley over the bridge.

The standard ingot size cranes will be built to handle 3 tons on the ingot hoist. In order, however, to provide a machine for the purpose of also handling other work about the plant, the machines are equipped with an auxiliary hoist of much greater capacity when desired.

The new standard electric traveling cranes which the company have just perfected have several features which are carried out in the construction of the special types wherever possible.

The girders are built of single web, rolled steel I-beams, or of the box section type, as conditions may require. Special attention is given to the lateral strain, which at times is very severe, as in the case of having to stop the bridge suddenly when the crane is working under full load. The box girder is of uniform strength

Fig. 1.—Seven-Ton Ingot Crane, Having Span of 32 Feet 6 Inches.

A NEW LINE OF ELECTRIC TRAVELING CRANES.

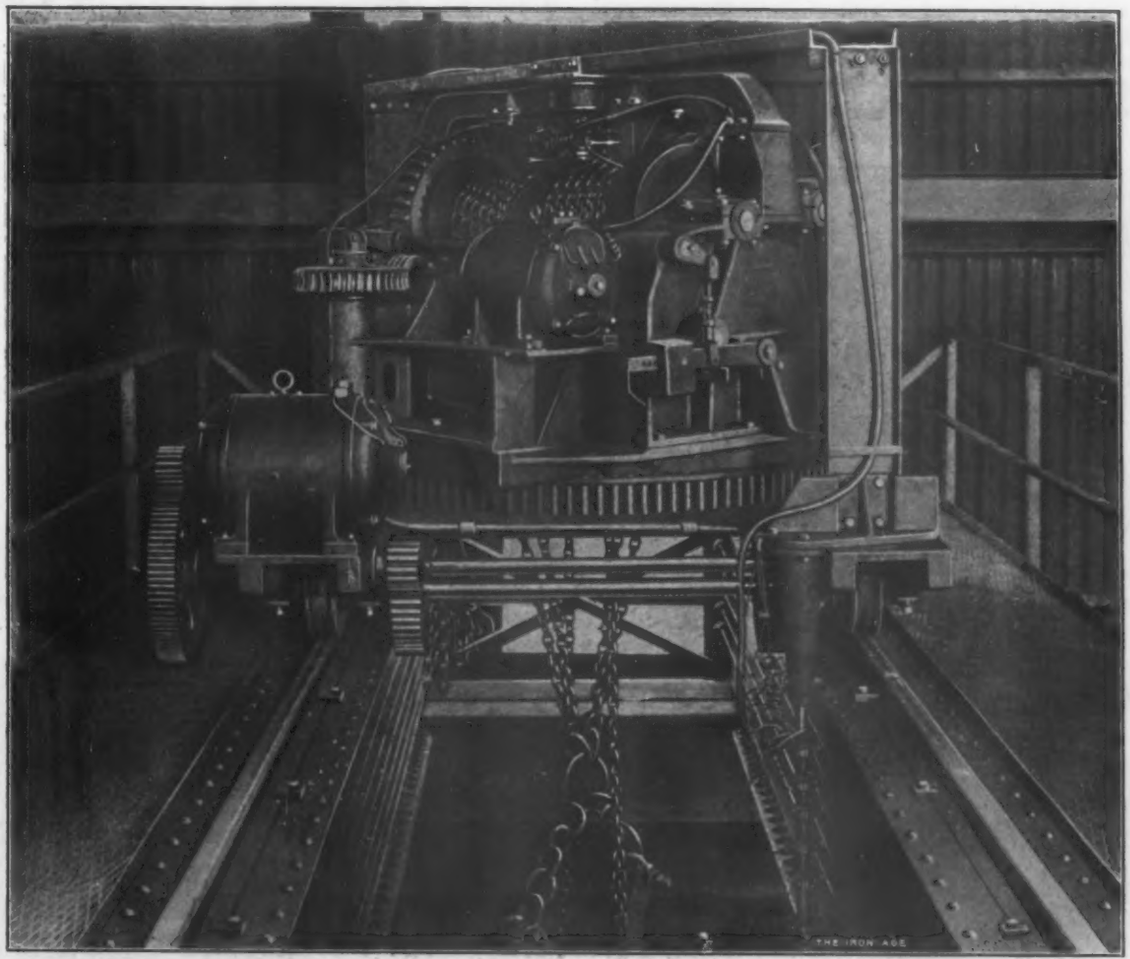


Fig. 2.—Trolley of the Ingot Crane, Showing the Rotating Motor.

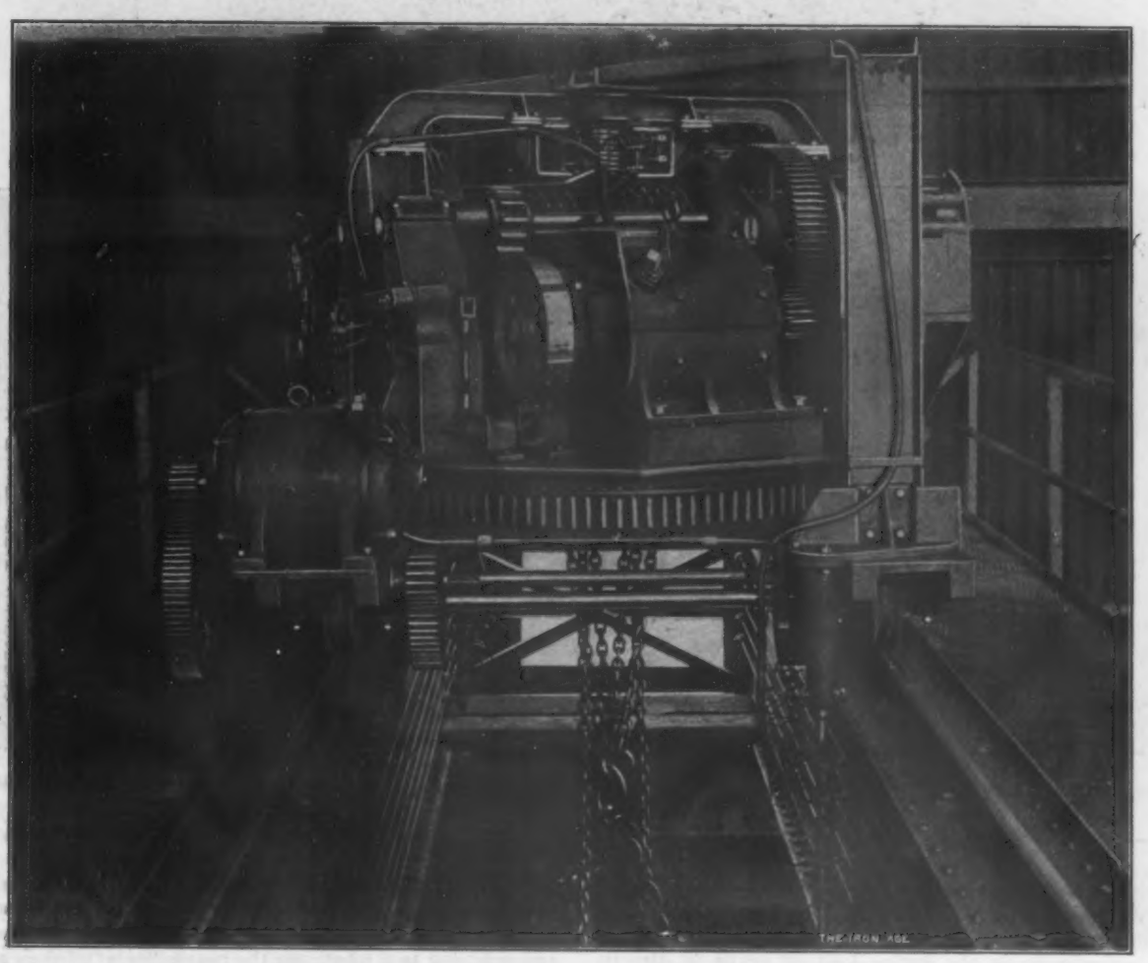


Fig. 3.—Trolley of the Ingot Crane, Showing the Hoist Motor.

A NEW LINE OF ELECTRIC TRAVELING CRANES.

or "fishbelly" type, and is built of two web plates and two flange plates fastened together with angles securely riveted to each. They are further strengthened by diaphragms at short intervals. The diaphragms are composed of plates the full depth of web plates, and are fastened to them by angles securely riveted. The diaphragms are cut off flush with web plates, thereby forming a solid foundation for flange plates, which is of importance, as the entire load of crane is directly in the center of top flange plates. The diaphragms also impart a great rigidity to the web plates, making it impossible for them to spring or buckle, thereby making them carry their proportion of the load.

The end trucks, as shown in Fig. 8, consist of structural beams or channels, with cast iron separators, all firmly bolted together. The separators are of tough gray iron, receive the truck wheel bearings and extend under the end of girders, to which they are rigidly secured by fitted bolts, thus forming part of the support for same and reducing to a minimum the possibility of girders getting out of square.

The truck bearings, one of which is shown in Fig. 7,

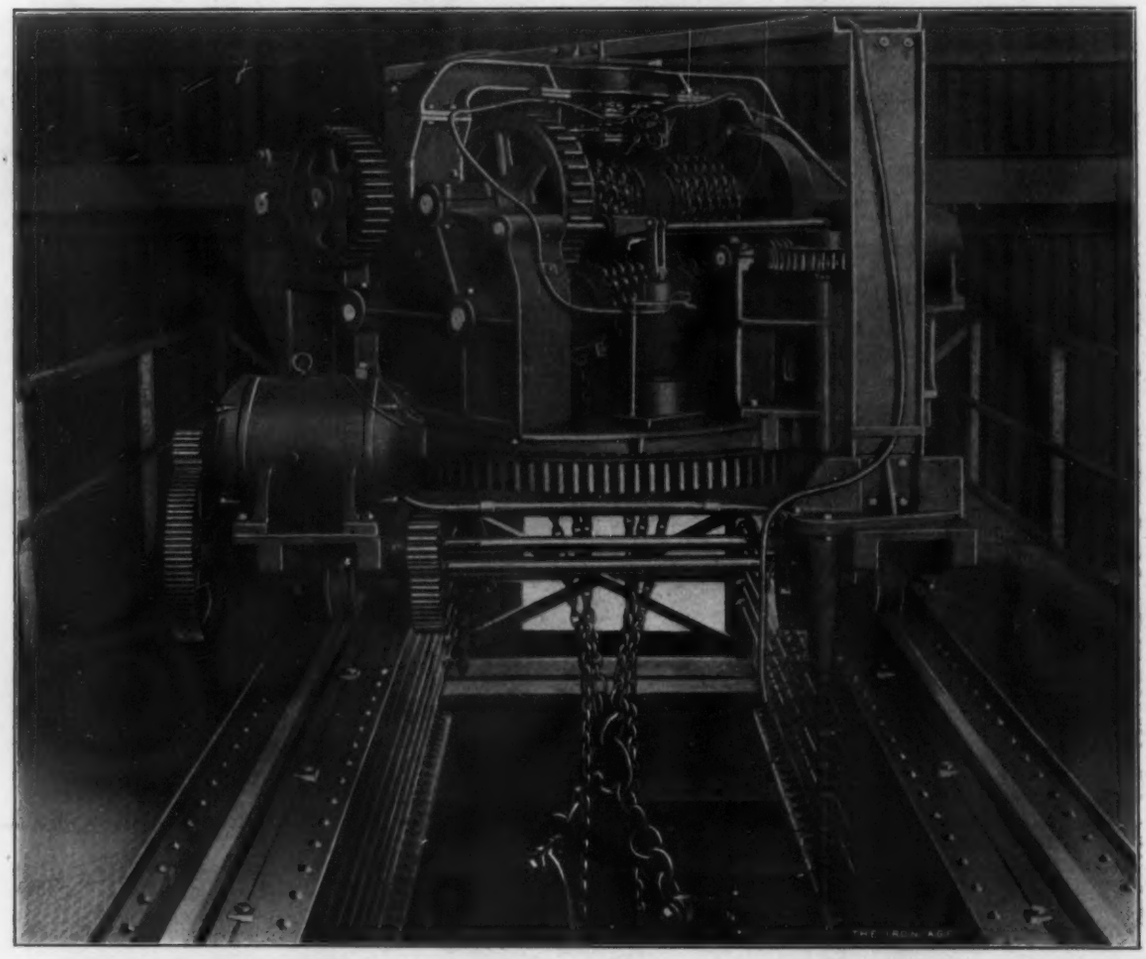


Fig. 4.—Trolley of the Ingot Crane, Showing the Solenoid Operating the Tongs.

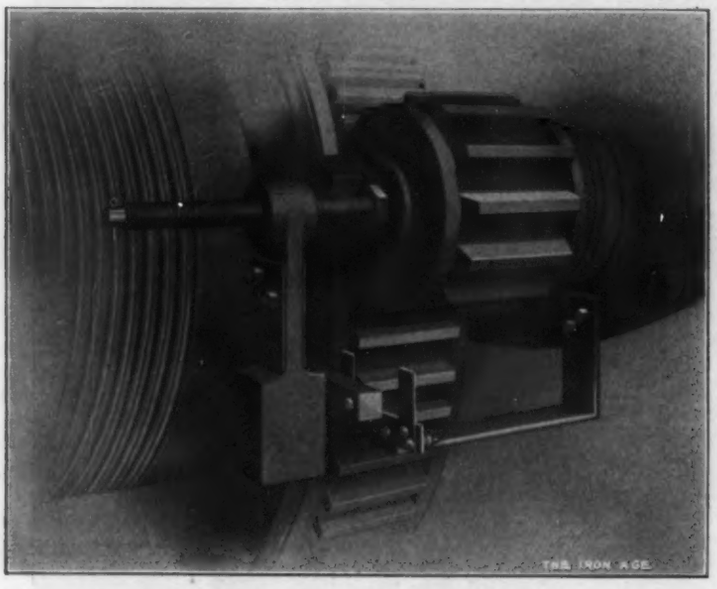


Fig. 5.—The Limit Switch, Which Prevents Jamming the Trolley Mechanism.

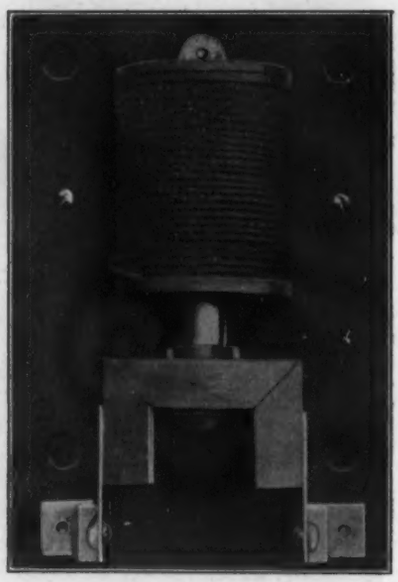


Fig. 6.—Solenoid Actuated by the Limit Switch and Operating the Hoist Motor.

A NEW LINE OF ELECTRIC TRAVELING CRANES.

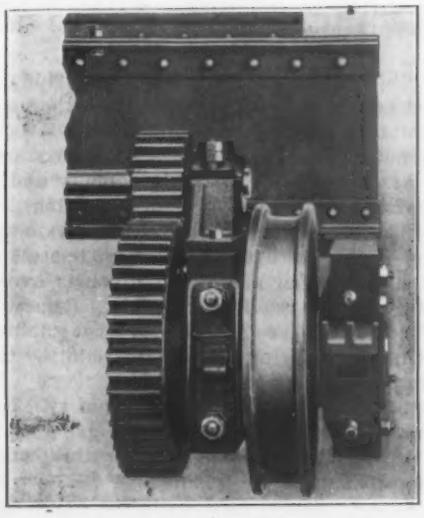


Fig. 7.—Journal Bearing Used on End Trucks.

are built along the same lines and with the same principle involved as those which are advocated by the Master Car Builders' Association. The latter construction, however, embodies an upper bronze bearing, for which is substituted "lumen bronze." The under half of the bearing consists of a cast iron oil chamber, which can be packed with waste, and insures constant lubrication. Should it become necessary to renew these bearings it is not necessary to jack up the end truck half the diameter of the axle, but simply to relieve the axle of its load, after which by removing the cap the entire axle wheel and bearings are readily accessible.

With this construction, also, the bearings are much more readily replaced where the wheels are keyed to the axle than they are where the axle is secured to the end truck and the wheel bronze bushed.

The girders rest on top of and are securely fastened to the end trucks by tight fitting bolts. This not only reduces to a minimum the possibility of girders getting out of square with the runways, but also carries the load upon the material itself rather than upon the rivets or bolts, as the case may be.

The trolley on cranes of 30 tons capacity and under is composed of cast iron side frames of box section securely fastened together through the means of a suspension beam, consisting of steel channels, and also by the drum shaft, which is securely fast to two bearings in each frame. The drum is of cast iron, supported upon bronze bushings having a bearing load of not to exceed 200 pounds per square inch area. It is machine turned and grooved right and left to provide for the hoisting cable. Cable is used in preference to chain. The drum is connected to the hoisting motor through the means of three reductions of spur gearing. The propelling mechanism is connected to the propelling motor in the same way, except that but two reductions of gearing are required.

The bridge propelling mechanism is obtained with but two reductions of gearing and the motor is located just above the cage, in which position it is conveniently looked after by the operator. The armature shaft of the motor is extended to the center of the bridge, where the power is transferred to the longitudinal or squaring shaft, which, in turn, transmits the power to the truck wheels. This arrangement has its advantages from the fact that the motor is located where it can receive attention, but at the same time the bridge is driven at the center, which prevents the driving of one end of the crane ahead of the other, as is the case when the power from the motor to the squaring shaft is transmitted at the end of the bridge, and, furthermore, provides against the objections to locating the motor in the center of the bridge, where it is not easily attended to and at the same time puts a twisting load on the side of the girder, which it is not ordinarily designed to withstand.

The mechanical or load brake is of the single screw type. There is provision made for adjustment and taking up wear. The brake is of ample strength to sustain the full load under all conditions, and is entirely automatic in its action, applying itself the instant the motor is stopped, and releasing as soon as motor is started.

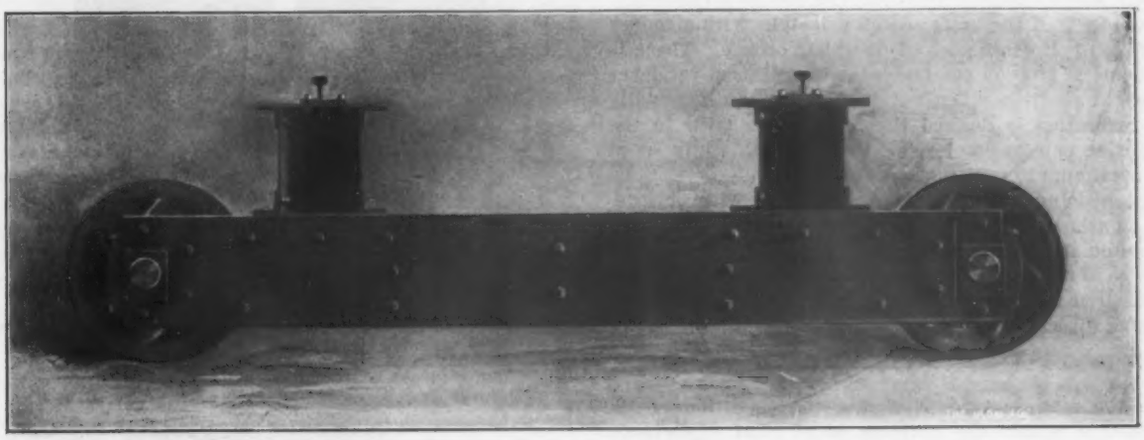


Fig. 8.—An End Truck Assembled.

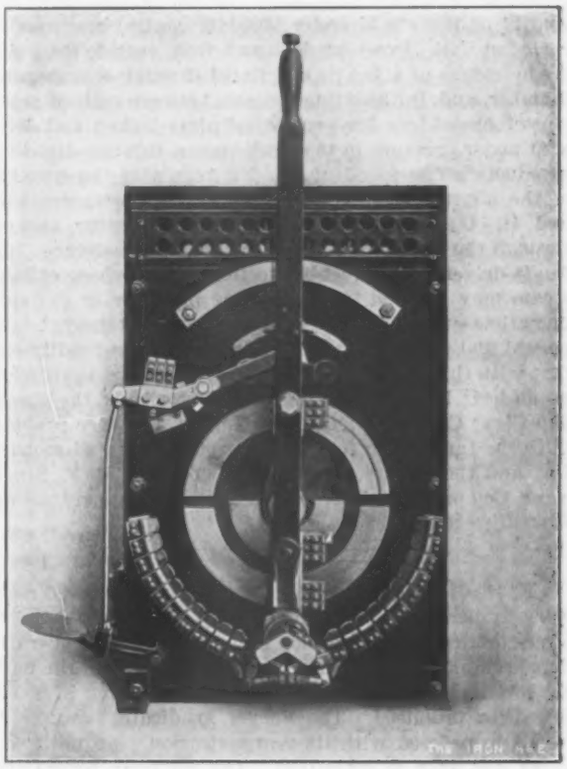


Fig. 9.—Controller Having Automatic Stop.

A NEW LINE OF ELECTRIC TRAVELING CRANES.

The electric brake is of the magnetic, rather than of the solenoid type, which permits the attaching of it direct to the armature shaft instead of by means of a brake wheel and levers.

One of the special features is the limit switch, which is illustrated in Fig. 5. This is a device which prevents the blocks from being raised high enough to jam on any of the trolley mechanism. By it the current is cut off from the hoist motor when the hook has reached a safe hight, and the motor is thus stopped in the hoisting direction, but it may be run in the lowering direction at any time by simply putting the controller in the necessary position. The switch is absolutely automatic in every respect, and requires no resetting whatever by the operator. As will be noted from the engraving, the operation is very simple. As the driving pinion of the hoisting drums runs, drawing the hook upward, a swinging weight is drawn to the right which, when reaching the proper distance indicating that the hook is near the trolley, forms an electric current actuating the solenoid which automatically stops the hoist motor.

The controller is of the double commutator reversing type, and it embodies in it some special features. It is illustrated in Fig. 9. There is a quick breaking device in the first step in connection with a magnetic blow out of great power, thereby reducing the arc to a minimum. The contact is of the knife switch principle, with a copper disk rolled between blades of phosphor bronze. There is an automatic stop on the quadrant to maintain the lever in upright position when not in use. Where especially close regulation is desired the foot lever shown in the illustration can be employed. By use of this any speed from maximum to zero can be obtained.

The resistance consists of coils of iron wire or grid-irons on asbestos tubes, supported on porcelain insulators. The automatic stop on the quadrant insures a perfect stoppage of the drum between the two movements, when it is desired to reverse. This prevents the sudden jar of swinging directly from one movement onto the other.

In the manufacture of cigars, the condition of the atmosphere within the building is of vital importance. The air must be kept moist, and at a constant warm temperature both in the winter and summer season. For maintaining an even moist and warm temperature the fan system is peculiarly adaptable, because the quantity and quality of the air is under absolute control and may be varied at will. Fresh air is drawn from outside the building by means of a fan, is circulated through a moistening chamber, and, in the winter season, between coils of steam pipes inclosed in a fire proof steel plate jacket, and delivered under pressure to the work rooms, through distributing ducts. The speed of the fan regulates the quantity of the air, the amount of steam varies its temperature, and it is evident that the amount of water sprayed through the moistening chamber varies its moisture. The fan is driven by a direct connected engine, whose exhaust steam may be used in the heating pipes, or in the summer time when heating is unnecessary it may be bypassed and utilized for other purposes. It is readily seen that with this system the expense of operating is very low, as no heat is wasted. The three factories of the American Cigar Company, located in Tampa, Fla., are provided with the fan system for heating, ventilating and moistening, and the results reflect credit upon the B. F. Sturtevant Company of Boston, Mass., whose apparatus and system were used.

F. H. Clergue states that the sum of $8,000,000 necessary to meet the Speyer loan and to set the works of the Consolidated Lake Superior Company again in operation has been made up and that $1,000,000 of it is in the hands of several banking firms, while the remaining $7,000,000 has been promised. The Speyer syndicate, however, intends to proceed with its reorganization plan until some *bona fide* offer is submitted. The company before their embarrassment controlled the Algoma Central & Hudson Bay Railway, the Manitoulin & North Shore Railway and numerous manufacturing industries at the Sault.

Bridgeport Motor Driven Wet Tool Grinder.

Electrical driving of machines by individual directly connected motors is being carried to even the smaller and minor units of machine shop equipment. We show now a tool grinder with a motor mounted upon a substantial bracket at one side of the main column, and with its armature shaft connected by flange coupling directly to the end of the grinding wheel arbor. Not only are all belts done away with in this design, but all chain or gear driving between motor and arbor is avoided, and the motor is also readily accessible. Removal of the arbor for renewal or changing of the grinding wheel requires the breaking of the coupling joint by taking out the bolts.

Wheels on machines of this class run at speeds somewhat lower than those for ordinary grinding work, so special provisions are made to meet this condition by arranging the armature winding of the motor to suit

BRIDGEPORT MOTOR DRIVEN WET TOOL GRINDER.

the speed requirements of the wheels used. The equipment of the machine includes a main knife switch, a starting box with no-voltage release, and also a speed regulator to increase the speed of the motor as the wheel wears away. This latter feature of speed regulation is hardly practicable in a belt driven machine, and constitutes a further point of advantage for the electrical drive, maintaining nearly constant efficiency for the grinder even when the wheel is nearly worn out.

The arbor bearings are self oiling and dust proof, and are said to require very little attention. The supply of water to the wheel is by air pressure, produced by the air pump attached to the right hand side of the column. The lower half of the column is an air tight chamber, filled with water, which may be forced into the upper chamber by a few strokes of the air pump. The large capacity of the lower chamber makes renewal of the water supply necessary only at long intervals. The general construction is such that access may readily be had to all parts for cleaning. Four sizes of the machine—20, 26, 36 and 42 inch—are built by the makers, the Bridgeport (Conn.) Safety Emery wheel Company. The motor shown attached to the grinder is of the Crocker-Wheeler make.

A Review of the Southern Iron Trade in 1903.

JAMES A. GREEN, CINCINNATI, OHIO.

The year 1903 in pig iron was a season of continuous disappointment. It saw the total collapse of the great boom of 1902. This collapse fortunately was not sudden, although in the retrospect it almost seems as if the market went to pieces like a house of cards. A better *simile* would be to say that the downward course of the market was like an avalanche that hesitatingly started from the top, always moving, sometimes slowly, but at last going faster and faster until it struck bottom with terrific force. Perhaps the best way to give a comprehensive idea of the happenings during this year of disaster and of hopes deferred is to take it up month by month, the records being made from notes taken at the time and which truthfully reflect the contemporaneous feeling.

JANUARY.—The month opened with a general sense of distrust in the prevailing high prices. Southern No. 2 foundry had sold in October, 1902—when the boom culminated—at $25, f.o.b. Birmingham, for spot shipment. Very gradually this price had fallen by the beginning of the new year to $20, and even $19. There was a vague feeling in the air that there was something insubstantial in the market, and buyers cautiously purchased only little by little as iron was absolutely needed. The tonnage of new business was small. On the part of the furnaces there was still, however, much confidence. The sense of strangeness in regard to high figures had passed, and these prices seemed to be almost normal. Many makers, in fact, had elaborate calculations that the price of iron could never again be under $15.

FEBRUARY.—Much the same state of affairs prevailed, except that No. 2 foundry was established at $18.50 for forward or prompt shipment. The accepted schedule of prices at Birmingham was:

No. 1 Foundry	$19.25
No. 2 Foundry	18.50
No. 3 Foundry	18.00
Forge	17.50

There was, however, a great deal of bushwhacking in forge, which sold down to $16.50. The month was marked by a much freer buying. The railroad situation helped the market, as it was impossible to move iron or coke promptly. The railroads North and South were blockaded. As an extreme example, it took one car 110 days to reach Cincinnati from Birmingham. Great piles of iron accumulated in the railroad yards at Ohio River crossings, because the roads north of the river were unable to furnish cars in which to take it forward. This alarmed buyers, who in many cases were obliged to shut down owing to a lack of raw materials, and, fearing further trouble, they bought ahead so as to be sure of getting iron when it was needed. In fact, the railroad situation had for eight months helped the market. That is, railroad freight service was so slow, so uncertain and so absolutely inefficient that it caused scarcity in the consumptive centers. It forced coke up to prices that seemed like the dream of Alladin's lamp. Here were the coke regions full of coke, but the ovens shut down because there were no cars to move it, and the coke simply smothered the makers. As far as the furnaces and foundries were concerned, the coke might just as well have been in Greenland. There was precisely the same state of affairs at the furnaces. They were frequently banked because of a lack of fuel, but there were no cars when iron was made to move it promptly. So an artificial, abnormal condition of affairs was created. There was a famine in raw materials because of the break down of railroad traffic.

MARCH.—Railroad conditions were still intolerable in March. The freight congestions at important railroad centers were greater than had ever before been known. There were enough cars, but motive power was lacking, and tracks were so blocked that there was hopeless confusion and delay. The railroad situation was so bad that the question of moving materials was more prominent than anything else, and it was the all absorbing topic of conversation in trade circles. Prices were the same, but toward the end of the month the independent Southern furnaces—that is, those not members of the association—began to make a vigorous effort for business, and they sold No. 2 foundry at $17.50, or $1 under the accepted schedule, and forge at $16. The month was marked by an exceedingly heavy demand for basic both from Virginia and the South. Finally, competition in the South became so exasperating that the association during the last days of the month met and announced a new price-list, as follows:

No. 1 Foundry	$18.00
No. 2 Foundry	17.50
No. 3 Foundry	17.00
No. 4 Foundry	16.50
Forge	16.00

with $1 per ton off in the East. This was done in order to stop the importation of foreign iron.

APRIL.—This was a more cheerful month. In the first place, there was good buying. In the second place, the railroads began to give better service. Freight moved more normally and the long and costly winter blockades were ended. These had cost the country thousands of dollars. In fact, the loss and interruption to business by insufficient railroad service cannot be computed. The reduction in prices caused a good spurt of buying early in the month, and the situation was much relieved by sales of 10,000 tons of forge, which the mills took for nearby shipment. A good deal of foreign iron in transit and under contract was forced on the market at sacrifice prices. This foreign iron had been a source of great profit at first to the importers, but the last importations meant tremendous losses. It is now a question whether or not a single ton of foreign iron was really needed in this country during 1902-1903. It was brought over in great quantities as a result of the apparent shortage in domestic iron, because of the stoppages of the furnaces, owing to the miners' strikes of 1902. Regular shipments of pig iron from the home furnaces were interrupted. Consumptive demands were enormous, business was on the flood tide, and it seemed as if the only chance to keep the general and special foundries running lay in iron from abroad. Thus, much of it was bought under the influence of abnormal conditions. Consumers were alarmed, and in their fright they bought more foreign iron than they really needed. They were willing to pay almost any price for iron which they were sure to get, and as this iron did not have to be made, but was actually in existence in the warrant and furnace yards on the other side of the Atlantic, they clutched at it as a drowning man grabs at a straw. While, of course, the first of it undoubtedly arrived at a most opportune time, yet if the domestic furnaces could have met its price and kept it out of this market, there is no doubt that the good times would have lasted longer. Its importations had a most disastrous effect on the market. Later on, when American furnaces needed orders, this iron was in consumers' yards, and in consequence it soon began to seriously affect prices. How widely this iron was distributed can be easily calculated when it is stated that not only was the Chicago market full of it, but the St. Louis market as well, and it was even shipped as far West as Atchison, Kan. So it did not alone affect the Eastern Pennsylvania and Virginia furnaces, but furnaces in Ohio, Illinois and Alabama as well.

MAY.—The market grew progressively duller. Demand fell off, and prices of the independent Southern furnaces kept sagging in a discouraging fashion. They sold No. 2 foundry at $15.50 and took about all the business that was going. But the associated furnaces showed no sign of weakness, and although they began to pile iron in considerable quantities, they maintained their full schedule. Toward the end of the month there was great confusion in the market. It was impossible to accurately state from day to day what was the exact situation. Inquiry kept falling off and things were going slower and slower. The independent furnaces began to quote No. 2 foundry at $15 and forge at $13, and scarcely anything whatever was doing.

JUNE.—The month opened in a more promising way, for on the 2nd the association met at Birmingham and

met outside competition by adopting a new schedule, as follows:

No. 1 Foundry	$15.50
No. 2 Foundry	15.00
No. 3 Foundry	14.50
No. 4 Foundry	14.00
Forge	13.75

These prices caused a little buying spirit, but the buying was of no considerable volume. After the first few days of the month the expectations which had been caused by the way in which the new prices had been received were rudely broken. It was apparent that the hope of any permanent betterment was illusive, for as the month progressed the market became more and more lifeless and the independent furnaces gradually quoted No. 2 foundry at $14. Purchases were entirely of the hand to mouth variety. The Northern irons in every section of the country were lower in price than Southern. It was hoped by the merchant furnaces that the purchase about this time by the Steel Corporation of about 100,000 tons of Bessemer might stimulate the general market, but it had no such effect.

JULY.—July was signalized by another reduction on the part of the association. A meeting was held in Chicago on the 10th, and these prices were announced:

No. 1 Foundry	$14.00
No. 2 Foundry	13.50
No. 3 Foundry	13.00
No. 4 Foundry	12.50
Forge	12.25

As previously this new schedule induced some little buying, but it was not of much consequence. Southern furnace stocks kept on increasing. The independent furnaces met the association reduction by putting No. 2 foundry at $12.50, and before the end of the month sales had been made at $12. But apparently even this price was not inviting, for but little iron was sold. The market, in fact, stagnated. It was absolutely without interest. The tonnage of new business this month was the smallest of the year. In fact, it was a regular Black Friday of a month.

AUGUST.—At the start August seemed to be destined to be as stupid and unsatisfactory as July had been. There was no anticipation of any betterment. But before the month was many days old there was a very decided movement in Ohio irons, malleable and foundry. Prices, of course, were low, lower than they had been for 18 months. This free purchasing sympathetically influenced Southern iron, and the outside furnaces, dropping to $12 for No. 2 foundry, sold freely. The association on the 17th met in Birmingham, and realizing that its previous prices were "strictly out of it," made a new schedule to conform with the times as follows:

No. 1 Foundry	$12.50
No. 2 Foundry	12.00
No. 3 Foundry	11.50
No. 4 Foundry	11.00
Forge	10.75

There had been a great deal of sentiment in regard to $12 iron. That was the price where Southern iron had halted in February, 1902, before the beginning of the boom, and many buyers had announced that when $12 was reached again on the downward tack that they would buy. In fact, there seemed to be a general belief both among producers and consumers that $12 was a kind of dead line, and that the drop in prices would necessarily be arrested there. This sentiment had a powerful influence on the market, for this reduction by the association was followed by a longer and more pronounced buying movement than had occurred at any time in the year previously. Of course, buyers were in better shape to purchase. They had been getting in high priced iron on late 1902 contracts up to July, for the furnaces had earlier in the year been well fortified with long time contracts at exceedingly good prices. While it is true that up to this time a good deal of iron had been piled, yet the average prices obtained by the largest Southern producers had been so good that they had not been seriously inconvenienced. But now these high priced orders were practically finished and the furnaces needed orders. Consumers needed iron, so the conjunction was a happy one, but it was a noticeable and ominous fact that nearly all the business was for quick shipment. The confidence in the future and the present that leads to buying for far ahead shipments was lacking. Still there was an excellent tonnage placed, particularly in the East, where the difference of $1 in price began to make the local furnaces uneasy. They saw their field invaded. They had had undisturbed possession of their local market for so long that the ghost of Southern competition seemed almost downed. Yet it was not a ghost that would keep down. It is well to note here that the first half of 1903 had been the haying season for the furnaces. So many of them in 1902 had been loaded up with low priced business that they had not had the full benefit of the boom. They had secured high prices for spot iron, but so little of this had been sold as compared with their total tonnage that the average prices obtained were not high. But when 1903 opened every order on the books was at highly profitable figures. The iron sold along during the year up to date had been at full quotations, and so they reaped the harvest of 1902 in the first half of 1903. It was a kind of a fall wheat arrangement.

SEPTEMBER.—The month was auspicious enough at the beginning, and for a little while it almost seemed as if the sentiment clustering around $12 was more than a mere sentiment. It appeared as if it might, in truth, be the real actual bottom where iron was to remain steady again. But this pleasing hallucination came to an abrupt end, for it was soon evident that there was more than enough iron to go around or not enough business to satisfy makers, or that the statistics were on the wrong side, since the independents decidedly cut association figures. They began by selling in the West on the Eastern basis. This had long been a sore point among Western buyers, who could not be made to see the logic of selling at one price in one section and at a higher price in another. So there was confusion worse confounded again in the market. It began to be very evident to all close observers that a decided change was near at hand.

OCTOBER.—The railroads came to the relief of the furnaces by reducing freights south of the Ohio River 50 cents a ton. This was a mere drop in the bucket, so to speak, though it helped the situation by putting freight rates on a parity with the lower prices, and it more nearly equalized the rates between the Northern and Southern quotations. On the 2d of this month another, and, as it proved, the final, meeting of the Southern Association was held in Birmingham. It was confidently anticipated that this meeting would make a really radical reduction in prices—a reduction that would drive to the tall timber the independent furnaces that had had such a fine time bushwhacking throughout the year at the expense of the associated furnaces. Heavy stocks had accumulated in the South, and no mere meeting of outside competition would suffice to reduce them. However, to the immense surprise of the trade generally the association adjourned after reaffirming the then existing prices. This left the association between heaven and earth. Within a few days it became evident that some of its members felt that they had to do something. They felt that they could no longer stand to one side and allow the outside interests and the Northern furnaces to have the field free to themselves. There was some little fault finding and then several of the largest and most influential of the companies in the association withdrew, and it thus came to an abrupt end. It had steadied the market during the whole of 1902, and had enabled the largest furnace companies there to act as a unit; it had rectified many loose and harmful customs that had crept into the trade; it established a 2240-pound ton, instead of one of 2268 pounds, and it had enforced terms of payment that were more advantageous and fairer to the seller than formerly. It had for 18 months been a potent force in the market. There is no denying its good qualities and good results. Unfortunately it did not include all of the Southern producers. This was its fatal weakness, and it was this fault in its structure that made finally the strain of a continuously falling market more than it could stand. And so this association, which had done more and lasted longer than any other Southern combine or "gentlemen's agreement" or "price committee," went out of existence.

There was among the members of the association con-

siderable post mortem criticism. Of course, this kind of comment necessarily has more or less truth in it, for it is so easy to be wise after the event. In other words, our hind sight is vastly better than our foresight. One of the regrets made by the members of the association was that in May or June when the old high priced orders were nearing completion they had not radically reduced quotations. That is, instead of waiting for the market to slowly settle, they thought they should have gone down at once. Had this been done freer buying would have been stimulated; competition from independent furnaces would have been choked off; and the furnace stocks, which later on did so much harm, would never have accumulated. Instead of making a wholesale reduction in quotations, and so anticipating an obvious situation, the association simply followed the market down little by little. However, it had the previous year done a great work, and it is easy enough now to see where in 1903 it failed. But had it embraced all the Southern furnaces it would have been much more of a power. As it was, the Southern furnaces, partly in and partly out of the association, were a house divided against itself, and it was this more than anything else that finally caused the trouble. The end of the association was the beginning of a fierce scramble for business. There was then a sudden realization of the fact that it was every furnace for itself and the devil for the hindermost. No artificial bar prevented competition, and prices were cut simultaneously by all the Southern makers. Of course, the $12 price had for some time been merely nominal, and at once No. 2 was offered at $10.50. Within a week it was down to $10. There it halted for a breathing space. There was some margin in the even price of $10, just as there had been in the $12 quotation, and faint hope was born that here the true nonpassable *ultima thule*, so to speak, dead line had been drawn.

NOVEMBER.—The idea that the dead line had been reached was rudely dispelled in November, for No. 2 foundry was quoted at $9.50 before the month had more than opened. By the middle of the month it had gone to $9.25. All the time there was a steady increase in buying. For the first time during the year there was a genuine buying movement in full force. This buying movement was full of vigor, and it continued day after day without intermission, so that the Southern ironmasters were at last selling iron a great deal faster than they were making it. Had it not been for the known stocks on hand, together with the unsatisfactory state of the money market, a wholesale buying of this kind would have resulted in a sharp advance in price. As it was, prices in the face of the purchasing did not show in November a hardening tendency. Some little Southern iron was sold for export, which was an index of the badness of the times. Of course, it was known that furnace costs had so greatly increased that there was not only no margin of profit to the furnaces in the prices that were being made; but, on the contrary, there was a positive loss.

DECEMBER.—The month opened with Southern No. 2 foundry quoted freely at $9, but all furnaces were limiting sales to as short deliveries as possible. In the first days of the month the buying culminated in what can only be adequately described as a grand rush. Then an advance came. For a day prices hesitated at $9.25, and then found solid ground at $9.50. The rebound from the bottom to a level 50 cents higher was practically instantaneous. And this establishing of an advanced quotation did not stop business. Naturally, it somewhat checked it, but even at $9.50 Southern iron is far too low, considering its cost, and it is relatively cheaper than when No. 2 foundry sold at $7 and forge at $6 in the panic days. At the time this is written December has not yet ended, but the whole situation has materially changed for the better. Southern No. 2 has sold for $9.75 and $10, with a much improved feeling in the market. The extensive buying this month and last called for much more iron than the furnaces can make within the period of contract deliveries, so that the stocks on hand will be called upon to supply the deficiency. In fact, even now they are being reduced. This will speedily result in a much better situation statistically than has been the case for months. The low prices were a drastic remedy, but apparently this was the only way out of the difficulty.

The Outlook.

In regard to next year, it is too early to hazard a guess. That we shall see a strenuous effort on the part of the furnaces to reduce costs is already evident. They must get costs down to meet changed conditions. And prices must go up, or the productive capacity of the country will be still further curtailed. When the whole thing is boiled down to its essence, it becomes, of course, a mere question of consumption. If consumption, which reflects the general business and demand of the country, revives and continues, pig iron will naturally take care of itself. And the best informed observers see that consumption is not in nearly as bad a state as might be assumed if one read only the Wall Street reports. The truth is that the United States is a good deal bigger than Wall Street, and the cotton, wheat and corn crops have more to do with pig iron than the rise or fall of speculative stocks.

In the foregoing brief resume of trade conditions in 1903 simply the surface facts in regard to the market have been stated. There has been no attempt to go into the larger philosophy of the situation. It is to be noted, however, that no great and tremendous period of expansion, such as we have had in the years 1902 and 1903, can leave the country as it found it. There has been a step taken forward which cannot be lost, no matter how prices may fluctuate. A substantial advance has been made. There has been new development all along the line, and this new development is not more than sufficient to meet the growing demands of the country. It is not possible that we shall be compelled to wait for the country to grow up to its industrial productive capacity. In fact, quite the contrary is true, and this can be said without contradiction, notwithstanding the troubles in the pig iron trade of the past year.

As for 1904, we are fortunate in beginning at the bottom. In 1903 we began at the top and had a bad fall. This coming year no such fearful decline in values, no such overwhelming collapse of the entire business structure is possible. We are to-day on bottom, and as pig iron is incapable of standing still, the only direction apparently in which it can move is upward.

Naval constructors and engineers are discussing now, more than ever, the scout, a new type of ship that is to take its place in service strategy in the future. The war problems which have been diligently worked out in Newport at the naval war college, and in Washington by the general board, have taken into consideration this ally of the floating force, and it remains to provide a ship which will meet all the tactical requirements. It looks, however, as if there would be another naval controversy over the design of these scouts, there being a difference of opinion among the naval experts as to the characteristics which these important vessels should possess. Several tentative designs have been prepared by the naval board of construction, and it has been decided that the displacement of the ships shall not be less than 1500 tons nor more than 4000 tons, a sufficiently wide range to take in the varied views of the experts. It is a question how much endurance these ships shall have, and whether there shall be much protection. An increase in the armor would mean a sacrifice in speed and coal capacity. The design will, therefore, be governed by the extent of the sea-going and sea-keeping qualities, with due regard for the elements which maintain a maximum speed.

In the modern industrial railway equipment where turn-tables are used for outdoor work there is always a temptation to set the turntables upon too shallow a foundation, the result being that they are thrown out of line by the influence of the frost. In the new plant of the B. F. Sturtevant Company, at Hyde Park, Mass., where special turn-tables of their own manufacture have been very successfully introduced in connection with their industrial system, each turn-table rests at the top of a brick circular well with 8-inch walls extending to a depth of 4 feet, or below the frost line. These walls are set upon hard-pan, and the center filled with loose stones, providing perfect drainage. The first winter's experience has shown them to be absolutely uninjured by frost.

The Thomas Carlin's Sons Company.

An illustration of what can be accomplished under the most trying conditions by energy and hard work was furnished this year by the Thomas Carlin's Sons Company, who operate large foundry and machine shops on River avenue, Allegheny, Pa. On the night of February 17 the entire plant, with the exception of the foundry, was completely destroyed by fire. The loss embraced the machine shop, warehouse and office building, pattern shop, and, in fact, everything with the single exception of the foundry. Work was begun at once, and, incredible as it may seem, it is a fact that in spite of the almost complete destruction of the plant, only one order was canceled. This was for grinding machinery, the buyer having waited several months, and was finally compelled to place the order elsewhere. The wreckage left by the fire was cleared away as fast as possible, and on May 2 a contract was placed for the erection of a warehouse, 60 x 118 feet, containing three stories and basement. The contract called for the completion of this building in 60 days, and it was turned over on July 6, only four days late. This warehouse is a brick building and the walls are 24 inches thick, with 3 inches air space, and are heavy enough to support two more stories. The floors are 10 inches thick and of slow combustion construction. It is equipped with fire doors on each floor and is practically fire proof. The first floor and basement are used for storage and small tools, the second floor for temporary machine shop and offices and the third floor for pattern shop. Power is furnished by electric motors on each floor, and a fire proof vault is also provided on each floor.

Machine Shop.—The contract for the machine shop building, which is 118 x 200 feet, was placed with William B. Scaife & Sons Company of Pittsburgh. It is a one-story building, constructed of steel and brick, and is practically fire proof. Careful attention was given to ventilation and light, and in these respects the shop is admirably equipped. The building is provided with a gallery on each side, 25 feet wide, and is commanded by two 20-ton and one 30-ton electric traveling cranes, with 50-foot span. The galleries are supported on 12-inch beams, capable of carrying a weight of 500 pounds to the square foot. These 12-inch beams rest on 20-inch beams, which are supported by steel columns resting on concrete foundations. The machine shop is equipped with a large amount of modern iron working machinery, among which are six planers, ranging in size from 36 inches to 8 feet; five boring mills, from 27 inches to 27 feet in size; two floor boring mills, and about 25 lathes, ranging from 20 to 60 inches in size. In one end of the machine shop is the blacksmith shop, which contains six down draft forges and a 1500-pound steam hammer. The floor of the machine shop is paved with brick. The galleries are provided with projections, so that the cranes can land material right on the floors. A railroad track on one side of the machine shop is served by a 15-ton traveling crane for the loading of machinery on cars.

The Foundry.—The construction of the foundry building is unique in many respects and the methods of handling and storing materials are decidedly original and are probably not duplicated in any other foundry in the country. This was made necessary by the fact that the tracks of the West Penn Railroad are close to the building and prohibit the storing of materials, except within the building itself. The foundry is 100 x 200 feet in size and of steel construction. On one side are provided second and third floors for the storing of supplies. These floors rest on 10-inch beams spaced 16 inches apart. The second floor is made of ⅝-inch steel plates and is capable of storing 1000 tons of pig iron. This iron is delivered on an elevated railroad track supported by a steel trestle. The third floor is capable of storing ten cars of coke, one car of fire brick, one car of facing and additional materials, if necessary. The coke is hoisted to the third floor by a coke elevator, run by an electric motor. These floors are supported by heavy iron pillars, which are separated from the columns for the traveling crane. There are two projections to these floors that allow delivery of materials to them. The projection extends all along the second floor and is commended by the cranes. The foundry is equipped with one 96-inch and one 76-inch cupola, the largest heat ever poured from one cupola, being 90,000 pounds. There are three core ovens provided with steel roller doors, the core benches, together with shelving in front of them, being made of steel plate. The core ovens are fired with natural gas. The cupolas are so constructed that they can be operated together, or independent of each other. They are equipped with Westinghouse motor and Root blower. Power for the entire plant is furnished by two 150 horse-power Russell engines and Westinghouse generators. Immediately after the fire the company placed mail and telegraphic orders with different machine tool shops and soon supplied themselves with a number of lathes, planers and boring mills, which permitted them to carry on business. They have recently placed contracts for a large number of additional iron working tools, which are now being installed.

Products Made.—The principal products of the Thomas Carlin's Sons Company are bar and billet shears, grinding machinery and contractors' supplies. The company also operate a separate boiler shop for the manufacture of boilers and heavy plate work. The company have facilities for making bar and billet shears from 4000 pounds up to 120,000 pounds in weight. In the heaviest shear they make the lever weighs over 16 tons and the bed 56,000 pounds. At the time of our visit to the plant the company had on the floor a large number of shears in process of manufacture, aggregating 400 tons, two of these being of the largest size, weighing 120,000 pounds each. In grinding machinery was noticed on the floor two 12-foot pans for grinding powder, equipped with rolls weighing 8 tons each, one 8-foot pan made entirely of wood, to be used for grinding dynamite, one 8-foot pan for grinding sand, and a 7-foot pan for grinding emery. In contractors' machinery, work on the floor included a 5-drum hoisting engine and derrick equipped with a clam-shell bucket, a 7x10 double drum engine with boiler, one of these being for shipment to Japan. The company make a complete line of hoisting machinery and concrete mixers, which they ship all over the United States and abroad. They have shipped three of these mixers to the Japanese government within the last two months. At the present time the site of the plant has a frontage of 464 feet on River Avenue, but additional ground has been purchased, which will give a total frontage of 700 feet, or a total of 108,000 square feet, most of which is covered by buildings. The business of the Thomas Carlin's Sons Company was originally established in a small way in 1860, under the name of Thomas Carlin, but was incorporated four years ago under the name of Thomas Carlin's Sons Company, with a capital stock of $200,000. The officers are W. J. Carlin, president, and W. C. Scott, secretary and treasurer.

Since commencing operations about three years ago in an unpretentious plant, and with a capital stock of only $10,000, the Buffalo Foundry Company, Buffalo, N. Y., gradually increased their facilities until their business demands necessitated the erection of what they claim is the largest and most modern jobbing foundry in this country. The capital stock has been increased to $500,000, and a site purchased on the Belt Line Railroad near Fillman avenue and East Ferry street, Buffalo, where a large plant was erected and put in operation last February. The main building is 145 x 320 feet, with an additional foundry, 35 x 120 feet. There are also several other smaller buildings, including pattern and office building, power house, storage room, &c. The company make a specialty of large and intricate castings, and have done work for some of the largest concerns in both this country and Canada. They have now under way large castings for 16 of the 2000 horse-power gas engines which are to be installed in the new Buffalo plant of the Lackawanna Steel Company, and castings for three 15,000,000-gallon pumps, which are being built by the Allis-Chalmers Company. Among the important companies for which they have done considerable work are the American Locomotive Company, De Lavergne Refrigerating Machine Company, Baldwin Locomotive Works and the Chambersburg Engineering Company.

The Largest Steel Plant in the World.

Works of the Lackawanna Steel Company, Buffalo, N. Y.

The greatest individual steel plant in the world is now approaching completion at West Seneca, N. Y., two of the blast furnaces, the great Bessemer plant and the rail mill having been put in operation during the past year. Work is now progressing rapidly on four additional blast furnaces, on a second rail mill for light rails and splice bars, on a structural mill and on a very large slabbing and universal plate mill, and contracts have only been lately let for a modern bar mill and for six 50-ton open hearth steel furnaces.

The Lackawanna Steel Company, who are carrying out this enormous undertaking, are the successors of one of the oldest rail mills in the country. Started originally in 1840, at Scranton, the Lackawanna Iron & Coal Company first rolled iron rails, but subsequently put in a Bessemer plant, making their first blow in 1875. The Scranton Steel Company were started in 1883, but in 1891 were consolidated with the Lackawanna Company, the new company being styled the Lackawanna Iron & Steel Company. In 1899, convinced that it was impossible to compete effectively in the steel rail trade when handicaped by the location at Scranton, the company began the erection of a new plant on an admirably chosen site at Stony Point, near Buffalo, the first plan having been to merely move the Scranton works to the new locality. In 1902 the Lackawanna Steel Company were organized, who acquired the property of the old Lackawanna Iron & Steel Company and purchased besides further property, so that at the resent time the same embraces the following:

In the Lebanon district, about one-sixth by ownership and an additional sixth by control, of the Cornwall Ore Bank Company, a tenancy in common owning the famous Cornwall mines in Central Pennsylvania and the two Colebrook furnaces at Lebanon, Pa. From the Cornwall Iron Company the company hold by a 20-year lease expiring December 1, 1922, the North Cornwall Furnace and the two Bird-Coleman furnaces at Cornwall, also owning one-sixth of the capital stock of the latter company. The company hold also about one-third of the capital stock of the Cornwall & Lebanon Railroad Company. A very large modern by-product coke oven plant has been erected upon the Colebrook property. The company also have a 20-year lease on the Cornwall Railroad.

In addition to the ore and furnace interests in the Lebanon district, the Lackawanna Steel Company have acquired 10,000 out of 30,000 shares of Witherbee, Sherman & Co. of Port Henry, N. Y., whose mines and plant were only recently described fully in the columns of *The Iron Age*. In the Lake Superior ranges the company have 5500 out of 20,000 shares of the Odanah Iron Company, owning leaseholds on the Gogebic range 6000 shares out of 12,000 shares of the Verona Mining Company, operating on the Menominee and Gogebic ranges: the entire 3650 shares of the Scranton Mining Company, 2000 out of 3000 shares of the Hobart Iron Company and 613 out of 920 shares of the Corsica Iron Company, all three operating on the Mesaba range. Besides this the company have a half interest in the Negaunee mine, have a ten-year contract for 100,000 tons of ore annually with the Stevenson mine in the Mesaba range, and have long time ore contracts with the Cleveland Cliffs Mining Company, which assure an ore supply for many years to come.

Since no Connellsville coal property was available, the Lackawanna Coal & Coke Company were organized to acquire and develop the fee or mineral rights of about 22,000 acres of bituminous coal lands in Indiana and Cambria counties, Pa. With headquarters at Werhum, Indiana County, the company have been opening up and equipping collieries to have an ultimate daily capacity of 10,000 tons. The coal can only be coked in by-product ovens, so that large coke oven plants have been erected and are in course of construction at Lebanon and at Buffalo.

The company have built and own the South Buffalo Railway Company, who operate about 7 miles of railroad connecting the yard trackage of the Lackawanna Steel Company directly and indirectly with all the lines of railroad centering in Buffalo.

The Lackawanna Steel Company have an authorized capital stock of $60,000,000, of which there has been issued $20,000,000, share for share for stock of the Lackawanna Iron & Steel Company, and $15,000,000 has been subscribed in cash, of which 80 per cent. has been paid and 20 per cent. is subject to call on 60 days' notice. The Cornwall Ore Bank and Colebrook Furnace properties are covered by $1,775,000 5 per cent. 30-year gold bonds, due February 1, 1926, and there have been issued also out of $20,000,000 authorized $15,000,000 5 per cent. convertible gold bonds, which mature on April 1, 1923. They are redeemable at the option of the company on April 1, 1906, or on any interest day prior thereto, at 60 days' previous notice, at 107.5. After that day the holder may up to April 1, 1915, convert the principal into an equal amount of stock at par.

The Board of Directors is one of the strongest connected with any steel manufacturing enterprise in the country. It is as follows:

J. G. McCullough, Governor of Vermont and director of the Erie Railroad Company and other companies.
Henry Walters of W. T. Walters & Co. of Baltimore, Md., chairman of the Atlantic Coast Line and of the Louisville & Nashville Railroad.
Warren Delano, Jr., prominently identified with coal mining interests.
C. Ledyard Blair of Blair & Co., bankers.
J. J. Albright, a leading capitalist of Buffalo.
James Speyer, head of the firm of Speyer & Co., bankers.
Moses Taylor, vice-president.
H. A. C. Taylor, a director of the National City Bank, of the Farmers' Loan & Trust Company, and of the Delaware, Lackawanna & Western Railroad.
H. McK. Twombly, a leading member of the Vanderbilt interests.
Cornelius Vanderbilt, a director of the Mutual Life Insurance Company.
Adrian Iselin, Jr., of A. Iselin & Co., bankers.
B. S. Guinness, a partner of Ladenburg, Thalmann & Co., bankers.
D. O. Mills, the well-known capitalist.
Samuel Mather of Cleveland, largely interested in Lake Superior iron ore mining and iron manufacturing.
Walter Scranton, chairman of the board.
Edmund Hayes of Buffalo, formerly of the Union Bridge Company.
M. Taylor Pyne, executor of the Moses Taylor Estate and a director of the Delaware, Lackawanna & Western Railroad, of the City Bank and of the Farmers' Loan & Trust Company.
G. R. Fearing, Jr., of Jackson, Curtis & Co., bankers, Boston.
K. B. Van Cortlandt of Kean, Van Cortlandt & Co., bankers.

The officers of the company are:

Moses Taylor, vice-president.
George L. Reiss, vice-president.
John W. Farquhar, secretary.
J. P. Higginson, treasurer.
C. D. Rhodes, general sales agent.
G. F. McKay, general traffic manager.
S. B. Sheldon, general superintendent of the Buffalo plant.

The company own a tract of about 1500 acres along Lake Erie at and beyond Stony Point, starting from the line of the city limits of Buffalo. At Stony Point the United States Government has built a very extensive breakwater, forming a commodious well sheltered harbor. From this, as is shown in the plan, Fig. 1, there has been dug a ship canal 200 feet wide and 22 feet deep and 3295 feet long, capable of further extension. Along this canal there is berth room for five lake vessels for simultaneously unloading. A good idea of the canal and the harbor may be obtained from Fig. 5, which is a view taken from the top of blast furnace No. 2.

The general design of the plant and of its most important details was made by Henry Wehrum, until recently general manager, who was for many years connected with the Scranton enterprises. The plan, Fig. 1,

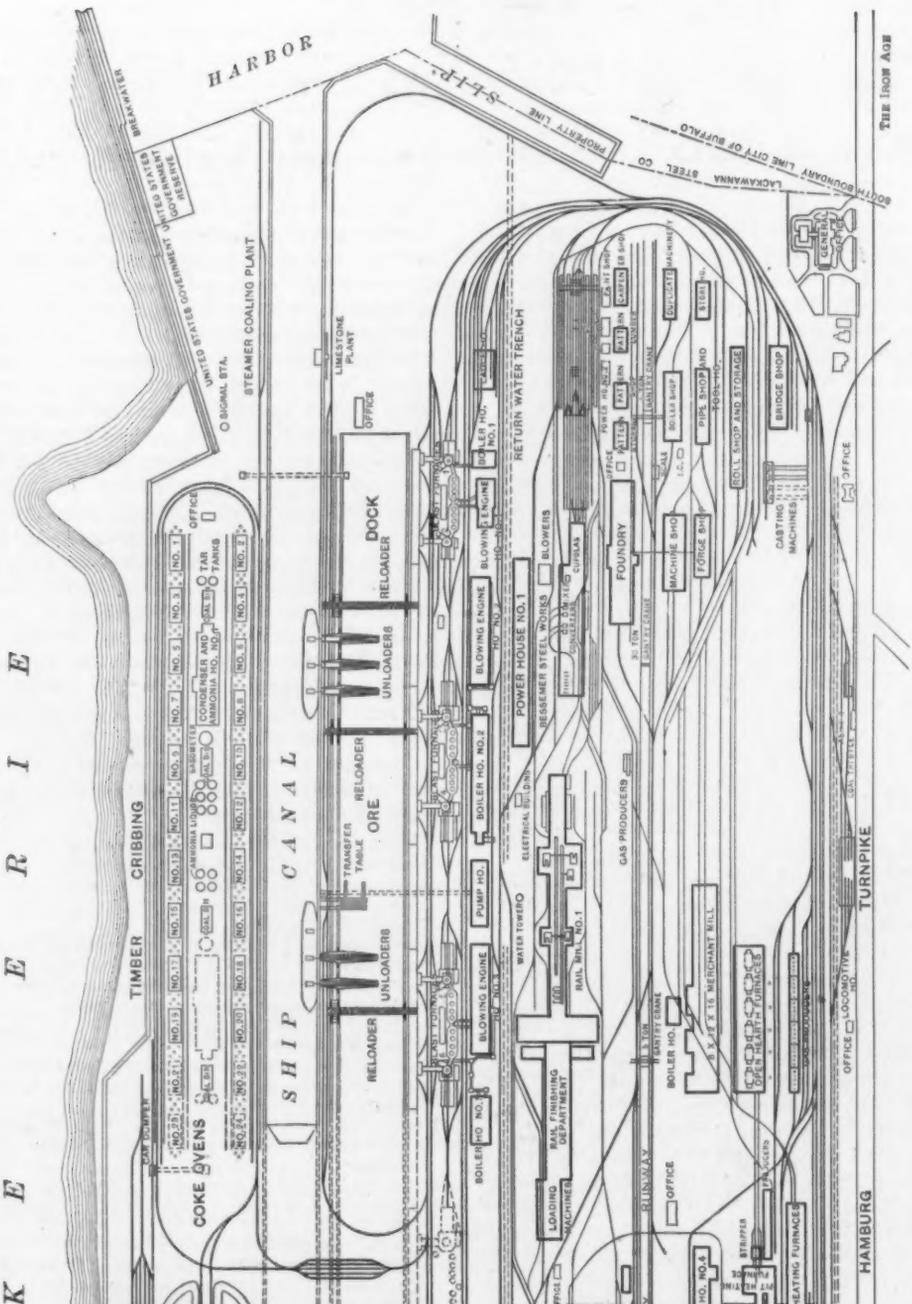


Fig. 1.—General Plan of the Works of the Lackawanna Steel Company.

shows its principal features. Parallel to the canal extends on the one side the by-product coke oven plant, while along the other bank stretches the ore dock with its ore unloading, handling and stocking machinery. Beyond this is the line of blast furnaces with the auxiliary plant and parallel to them the steel plant, rolling mills and shops, the whole constituting a harmonious whole. Access from the one side to the other side of the ship canal is obtained by a tunnel 400 feet long, whose two shafts, 104 feet deep, are equipped with electric elevators for passenger service. The tunnel, which is cement lined, is used also for electrical cables and water pipe. Its location is indicated by dotted lines in Fig. 1.

A large part of the tract consists of soft alluvial material, which has necessitated elaborate pile and concrete foundations for all the principal parts of the plant. Wherever the heavy machinery has been in operation the soundness of these foundations has been thoroughly proven. A limited area of the ore dock, under full load gave way in September, 1903, at a point where the shelving rock below the slit apparently caused the piles to slide. The hole has been filled with molten cinder, and extensive tests with full loads at adjacent points have demonstrated that the trouble was only local.

The Coking Plant.

The coke oven plant is located along a strip of land between Lake Erie and the canal. The original plan calls for 20 batteries of by-product ovens with an aggregate of 940 ovens, built in two lines, with the condenser plant, coal bins, &c., between them. This arrangement is shown in Figs. 6 and 7. At present ten batteries are built or under construction, this being the line nearest to Lake Erie. Of these ten batteries, four are of the Otto-Hoffman type, while six are of the Rothberg type, with horizontal flues and recuperation of the air of combustion. The ovens are 16 inches by 6.5 feet high and 33 feet long, and deliver 6 tons of coke per charge. The Otto-Hoffman ovens are equipped with four hot stoves 13 x 60 feet, and one stack 5 feet inside diameter and 140 feet high.

In order to handle from 6000 to 7000 tons of coal per shift, which is required when the whole plant is in operation, a Hulett car dumper, Fig. 2, has been erected, which will empty from 25 to 30 cars of coal per hour. The coal cars will be brought to the car dumper by means of an electric mule hoist and dumped sideways into two receiving hoppers. The empties, running against a kick back, will be collected in the yard. From the receiving hoppers the coal will be elevated and conveyed into four bins, each of 1500 tons capacity, by means of a system of 36-foot belt conveyors provided with automatic tripping devices over the bins. The total length of the belt conveying system is nearly 2600 feet.

Running along on tracks parallel to the line of ovens are the combination coke pushing and coal charging machines, provided with a run for pushing the coke from the ovens, and also carrying a box containing the compressed coal for charging the ovens. Underneath the coal bins there are located four parallel tracks for supporting these boxes, when they are run back under the chutes of the bin to be filled with coal. Placed underneath each bin are eight ramming machines, two over each track, which compact the coal as it is chuted into the boxes. These machines consist of electrically operated hammers working in steel guides. After a box is rammed, it is run out onto the combination machine, and carried to a position opposite the oven from which the coke is to be pushed. After the coke is pushed out, the charging box is brought opposite the same oven and the coal cake is charged into the oven. The coke is pushed from the ovens into large pans, where it is quenched. The pan is then picked up bodily by a gantry crane and emptied into coke cars standing on tracks between the gantry crane tracks. There will be provided ten gantry cranes of 20 tons capacity for handling the coke pans. Each pan is of ample size to receive a full charge from one oven. The coke, after being discharged into the pans, is quenched and then dumped into receiving cars by means of the gantries, which travel on a track in front of the ovens. Each crane is provided with two independent hoists of 10 tons capacity each, fitted with independent electrical and mechanical brakes. The pans are emptied by running one hoist ahead of the other, thus tilting the pan, and allowing the coke to run out.

Experience gathered at the Lebanon plant of the Lackawanna Company, where 121 ovens have been in operation, has shown that it takes about 30 hours to coke the coal from the new mines of the Lackawanna Company at Wehrum, Pa., the yield of coke being 80 per cent., while the yield of ammonia is about 2 pounds per ton and that of tar 2 per cent.

The condenser house is 375 feet x 83 feet 4 inches and contains 36 air coolers, 16 water coolers, 6 scrubbers and 8 extractors. The plant is equipped with two gas holders of 50,000 cubic feet capacity, six ammonia tanks, each 34 feet in diameter and 30 feet high. Six tar tanks of the same dimensions provide storage for a three months' supply of tar. For supplying steam for the ammonia house there is a battery of four Cahall boilers.

The Ore Handling Machinery.

The entire ore handling machinery of the plant was designed and erected by the Wellman-Seaver-Morgan Engineering Company of Cleveland, Ohio. The general layout is best shown in the accompanying elevation, Fig. 8, while the photographs, Figs. 4 and 5, convey a good idea of the magnitude and the character of the plant. The equipment consists of five Hulett ore unloaders with cantilevers, which deliver the ore from the vessels on the or dock, and three reloaders, which convey it to the handling system tributary to the furnaces themselves.

The Hulett unloaders travel back and forth along the dock so as to be able to go from one hatch to another at any time desired. They consist essentially of a walking beam mounted on a trolley frame, which has a back and forth motion, at right angles to the canal, on a movable bridge or gantry. To the outer end of the walking beam is attached a vertical leg supporting a bucket having a capacity of 10 tons. In operation, the outer end of the walking beam comes close down to the trolley frame, and the trolley carriage runs forward until the bucket is over the hatch of the boat. The bucket is then lowered onto the ore in the boat, automatically filled, raised, and at the same time the trolley is returned to its original position on the dock, the bucket dumping its load through a hopper into a bucket car. This bucket car is then hauled across the girder and up the inclined cantilever under control of a separate operator. The bucket is tripped automatically at any point desired on the cantilever, and the ore falls into the stock pile. The operator, who controls all the motions of the machine, except the moving along the dock from hatch to hatch, is located in the bucket leg, and goes down through the hatch with his bucket at every trip. This enables him to watch very closely the operations of the bucket and to work into the corners of the boat more successfully. To enable the bucket to reach all the ore in the boat, the leg on which the bucket is suspended is mounted on a rotating table at the top of the bucket leg, and the operator is enabled to rotate the bucket into any position desired, so that it extends when open lengthways of the boat, or crossways, or in any intermediate position desired. The bucket when wide open has a reach of 18 feet, but when so desired this reach can be extended 2 feet 6 inches further, this movement being in a straight line, acting as a hoe to pull the ore out of the corners of the boat. The distance between hatches on modern boats, as a rule, does not exceed 24 feet, so that the bucket reaches from the center of one hatch more than half way to the center of the other. These machines have unloaded 95 per cent. of the cargo of a modern boat, the minimum rate being 200 tons per hour per machine, with a maximum rate of 600 tons per hour. The power for closing the bucket is furnished by a large hydraulic cylinder mounted in the bucket leg with the bucket. For rotating the bucket in a circle a smaller double acting hydraulic cylinder is provided.

In case it is not desired to put the ore onto a stock pile, it may be loaded direct through the chutes at the front end of the machine into hopper cars, as there is a track provided under the machine for placing these cars. Only two operators are required for each machine. The capacity of the bucket and bucket car is 10 gross tons per trip. On the corner of each machine is provided a

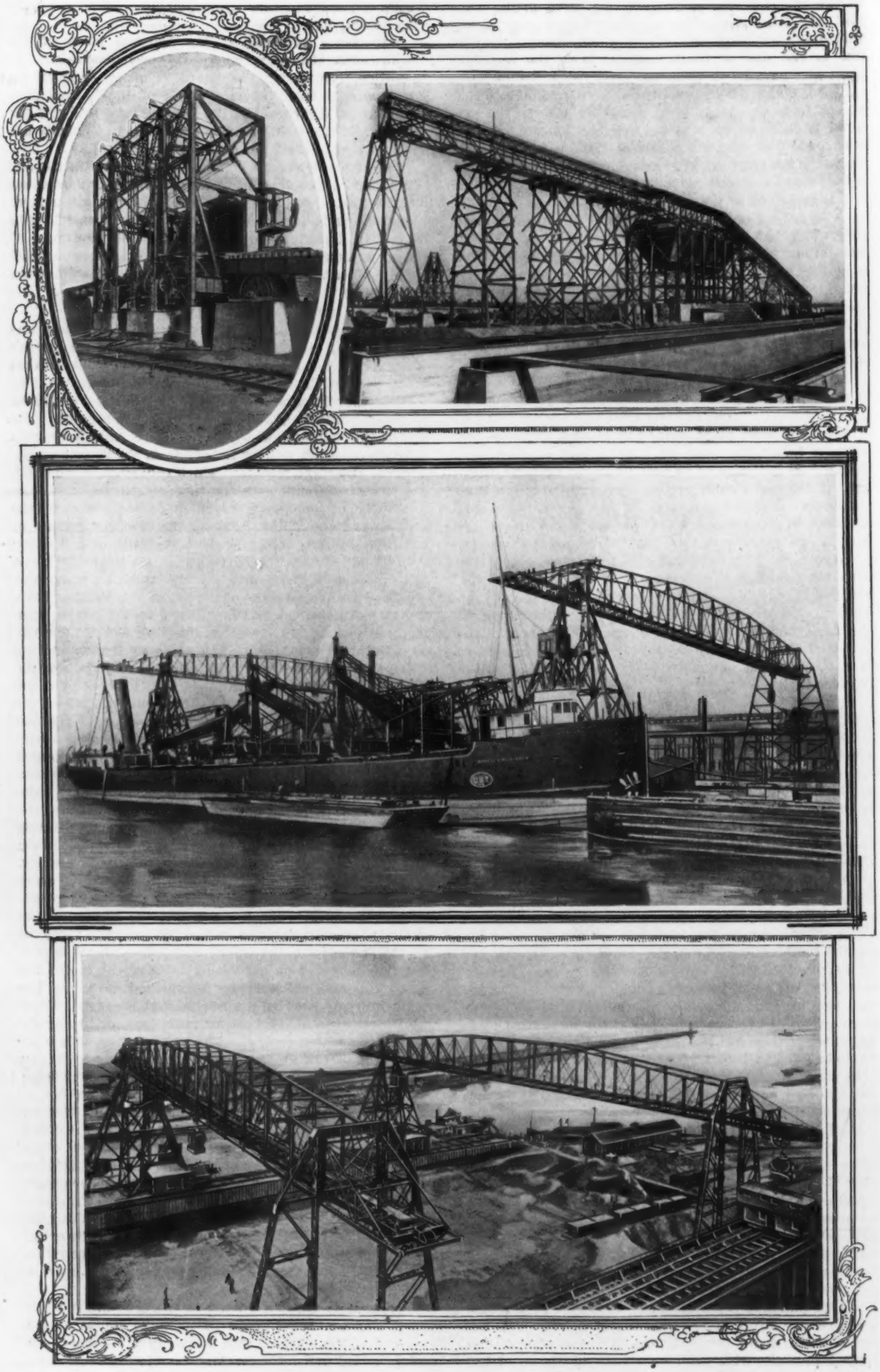


Fig. 2.—Car Dumper, Coke Plant. *Fig. 3.—Coal Bin No. 4, Coke Plant.*
Fig. 4.—Unloading Ore from S.S. "Horace S. Wilkinson."
Fig. 5.—View from Top of Blast Furnace No. 2, Showing Harbor, Ore Dock, Reloaders and Canal.

small revolving derrick, which is operated by a separate motor. After the large bucket has reached all the ore that it can get at in the boat the balance, which is usually about 5 per cent. of the cargo, is shoveled into small 1-ton dumping tubs by hand. These tubs are then hoisted out and swung over the hopper by the derrick. In this way the entire cargo of the ship is unloaded without the necessity of its moving from its dock. The principal dimensions are: Clear span between tracks upon which the unloaders travel along the dock is 725 feet. The length of the overhang of the cantilever from the center of the rear track on which the unloader travels to the end of the cantiliver is 158.25 feet and the hight of the top of the girders from the track is 20.5 feet.

The dock width from center line to center line of the retaining wall is 279 feet, and there can be stored in it approximately 600 gross tons of ore per running foot. The reloaders, which have a span of 293.5 feet, have a cantilever on the boat side of 48 feet and on the bin side of 33 feet, the hight in the clear above the general level being 85 feet. The lateral trolley travel is 356 feet 11 inches.

The front or machinery tower of the bridge is run on the same track with the rear end of the unloader, these tracks being about 30-foot gauge. The machinery for operation of the bridge is all located in the front tower and is electrically driven. The ore is lifted out of the stock pile by a 7½-ton Hulettt self filling excavating bucket, which, after filling itself, is hoisted and conveyed over the bins and bin filling cars, into which it directly dumps. The speeds of action of the bucket are about as follows: Hoisting speed, 200 feet per minute; traverse of trolley on bridge, 800 feet per minute; traverse of bridge along tracks, 50 to 75 feet per minute.

The brakes are so arranged that in case of any mishap to the electric power they are applied by gravity, all machinery being instantly held. It is impossible to drop the load. One operator can perform all operations of the bridge. On the bridge traverse mechanism is provided a safety brake so arranged that in order to move the bridge along the length of the ore piles it is necessary for the operator to stand on a weighted platform, which releases the brake from the moving gear, and he remains standing on this platform until the bridge is moved to the desired position. Immediately on stepping off the brake is automatically applied, so that it is impossible for a heavy gust of wind or accident to start the bridge, the brakes being powerful enough to skid all of the wheels.

The automatic buckets are somewhat of a new departure in handling iron ore at furnaces. They will handle the hardest lump ore, limestone and other obstinate substances. They have an advantage over other methods of handling ore in winter time, when the ore is full of frost, in that their weight will go through 4 or 5 inches of frozen crust. After the pile is once opened up, it will work its way under the crust, making it more easy to break it away. The bridges will easily handle 250 tons per hour each.

Bin System.

Parallel to the line of blast furnaces on the side toward the lake is a bin system with a capacity to take care of ore and limestone for the production of 3800 tons of pig iron per day. The bins are of the suspended parabolic type, 26 feet on top and 16 feet deep, having a total capacity of 443,437 cubic feet. They are divided by vertical partitions into 25 or 50 foot lengths for the different kinds of ore and stone. The bins are connected by trestles between each pair of furnaces, the total length of bins and trestles being 2500 feet. The steel structure from which the bins are suspended supports the tracks for a 50-ton traveling receiving bin and tracks for 10-ton dump cars. The ore, which is picked up from the ore yard by means of a 7½-ton grab bucket operated by the reloading bridges, is dumped into the traveling receiving bin or gantry, which, in turn, fills the dump cars running underneath. These cars, of the hopper bottom shape, are then run to any of the bins and the ore emptied. The bins are provided on the bottom with very large openings and conveying gates, which consist of two cast iron drums and an endless rubber belt. The drum shafts are supported by a cast iron frame provided with adjustable bearings. The outer drum shaft has a driving gear, which engages into a pinion located and pivoted on the scale larry frame. The gates, therefore, can only be started by the operator of the larries. The scale larries consist of two hoppers, provided with suitable gates, and are suspended from a structural frame and run on tracks supported by columns of the bin structure. They are electrically driven, and each fitted up with five-scale beams. Each hopper has a capacity of 75 cubic feet.

In regard to handling of coke, the feature of dumping it from railroad cars into stationary bins has been abandoned, and in order to save rehandling the coke will be brought direct from the ovens to the furnaces in pans, holding about 9 tons of coke. These pans are mounted on cars, and pivoted in such a manner that by hoisting the rear end of the pan the coke slides out into a hopper, provided with a gate, and from there is dumped into the furnace skip. By this method the breakage of coke is reduced to a minimum.

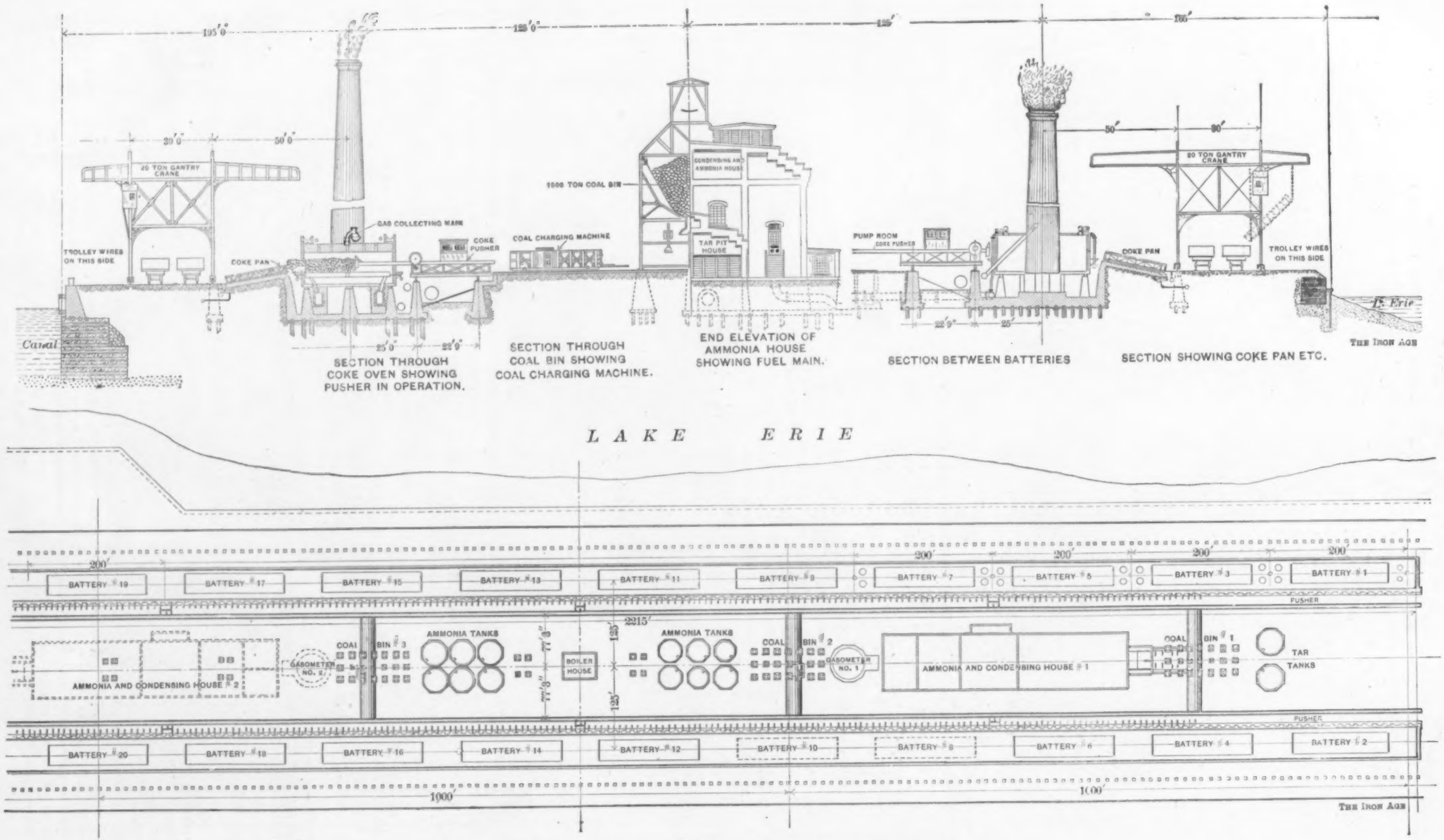
The Blast Furnaces.

As shown in the plan, Fig. 1, the blast furnaces are disposed in groups of two in a row parallel to the canal and ore dock. The first of these groups, being furnaces Nos. 1 and 2, was built very largely of materials of furnaces located at the Scranton works. The two furnaces were blown in respectively on February 13, 1903, and May 2, 1903, and have an aggregate capacity of 15,000 tons per month. The next groups, furnaces Nos. 3 and 4 and furnaces Nos. 5 and 6, are entirely new, and will gradually enter the ranks of producers. So far as resent progress with them indicates, No. 3 will be blown in April or May, to be followed in September by No. 4, and later on by Nos. 5 and 6.

Furnaces Nos. 1 and 2 are smaller, the other stacks being considerably larger. No. 1 has a 10.5 foot hearth, 17-foot bosh and is 86 feet high from the bottom of the hearth to the top of the ring, while No. 2 has a hearth 11 feet in diameter and a bosh 17 feet in diameter. It is 86 feet high. The furnaces are blown through 16 4 inch tuyeres. Gas is taken off at three points, and there are provided explosion doors, which have an area of 50 per cent. of the area of the top of the furnace. Each furnace is flanked by four central combustion stoves 18 feet diameter and 84.5 feet high. They have a volume of 8275 cubic feet, and a heating surface of 24,600 square feet, the average blast temperature being 900 degrees F. They were moved from Scranton.

After passing through the dust catcher, the gas is conducted through a 60-inch main, into which water is injected through a series of 12 jets. This main is connected with a horizontal tank, which serves the purpose of a gas water valve, from which the dust and water are discharged into a railroad car placed below it as a settling tank, the water overflowing and running into a sewer. From the valve a second main leads to the gas washing plant, the main being also equipped with 12 jets of water. The washing plant consists of two sets of Buffalo Forge Company's double fans driven by Westinghouse induction motors. Into these fans sprays of water are delivered to complete the washing, by far the greater part of the dust having been gotten rid of in the dust catcher and in the mains. The double gas washing plant is so piped that the gas may be passed through the washers in series so that the gas is twice washed or that it is washed only once. The gas which goes to the gas engine plant is washed twice, while that which is delivered to the stoves is to be washed only once, the capacity of the stoves being greatly increased and their life being extended through such a course. At the present time neither the supply of gas for the boilers nor that for the stoves is washed.

The lower plant of furnaces Nos. 1 and 2 consists of a battery of 16 Cahall boilers, and a series of blowing engines which have been moved to Buffalo from the Scranton plant. For these old engines the steam pressure is lowered by a reducing valve from 125 pounds to 40 to 50 pounds. The engine plant consists of three Dickson horizontal engines, having 60-inch steam cylinders, 80-inch air cylinders and 100-inch stroke. The steam cylinder of one of these engines built in 1879 was again put in place as it was patched years ago after an accident, the repairs



Figs. 6 and 7.—Plan and Elevations of By-Product Coke Oven Plant.

then made under exceptional circumstances having proven exceedingly efficient. Each of these old engines delivers about 560 cubic feet of air per revolution at 15 pounds pressure and runs at a speed of 17 revolutions. They together blow furnace No. 1, while furnace No. 2 is blown by two I. P. Morris beam engines, with 58-inch steam cylinders, 93-inch air tubes and 120-inch stroke. They deliver 940 cubic feet of air per revolution, each making 15½ revolutions. A Weiss condensing plant completes the equipment, which is temporary, the intention being to blow these furnaces with the gas engine driven blowing engines now being installed in blowing engine house No 2. The present plant will then be in reserve and for starting.

The iron from furnaces Nos. 1 and 2 is cast into 25-ton Pollock ladle cars, there being two double string Heyl & Patterson casting machines. The limestone used is Canadian fossiliferous, carrying from 2 to 2.50 per cent. of silica. Some New York State limestone is also occasionally employed. The ore mixture, consisting of 19,800 pounds of various lake ores, including Lake, Minorca Cliffs Shaft and Verona, and 1200 pounds of roll scale, yielded recently 54.21 per cent. of iron.

The lines of new furnaces, Nos. 3, 4, 5 and 6, are shown in the accompanying engravings, Figs. 9 and 10. The bottom of the hearth is 13 feet above the general level, so that there is ample head room for the iron runners. The plant is so arranged that there is provision for eight 25-ton iron ladles and for three cinder tubs at casting time. The furnaces are blown through 20 tuyeres, and the mantle carried by ten columns. The furnaces are 94 feet high, have a 17-foot hearth, 10 feet high, a 24-foot bosh, and are 18 feet in diameter at the stock line. The volume of the hearth is 2269.8 cubic feet and that of the stack to the stock line is 20,400 cubic feet. A bosh jacket ⅝ inch thick has been adopted, as shown in the drawing. Besides this there are a series of 72 cooling plates below the tuyeres.

One special feature of all the furnaces is a movable oval deflector, A, hung on chains and operated by two screws placed at right angles, as shown in Fig. 11 at B. This deflector is to be used to distribute the stock as occasion may call for.

The gas is taken off at three down comer openings, and there are seven explosion doors. The bustle pipe is 6 feet 2 inches inside diameter and the dust catcher is 32 feet in diameter. A gas washing plant embodying some special features is being designed.

The furnaces are equipped each with four central combustion hot blast stoves 20 feet in diameter and 135 feet high. They have a heating surface of 56,800 square feet.

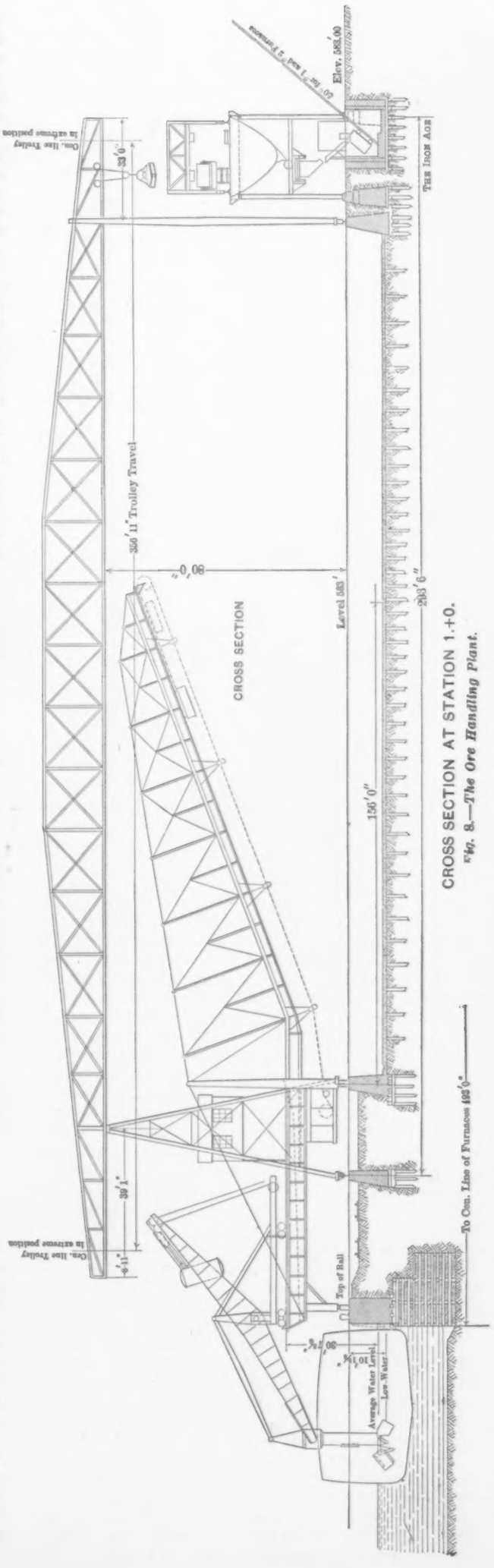
For the steel works and for general power purposes there is located at furnaces 3 and 4 a boiler plant consisting of 80 Cahall boilers, which are now fired by hand with coal. Later 32 of them are to be fired with gas.

These large furnaces are expected to make 700 tons per day and may possibly produce more. The blowing power is such that 75,000 cubic feet of air can be delivered to each furnace at 30 pounds pressure. The normal pressure will be about 18 pounds, and the blast temperature 1000 degrees F.

The Blast Furnace Gas Engines.

After a thorough study in Europe of the problem of utilizing waste blast furnace gas for electrical puposes and for driving blowing engines, the engineers of the Lackawanna Steel Company decided upon the installation of what will be, when completed, the most extensive plant of its kind in the world. The whole undertaking involves three plants, one located in power house No. 1, consisting of eight completed Koerting 100 horse-power gas engines, driving dynamos, the second located in blowing engine house No. 2, with eight 2000 horse-power Koerting gas engines, driving blowing engines, which are now being erected, and a third, of like capacity, to be installed at blowing engine house No. 3, to serve furnaces Nos. 5 and 6.

The gas with which the electrical plant has been driven has been furnished by furnaces Nos. 1 and 2, the calorific power averaging about 85 to 90 British thermal



CROSS SECTION AT STATION 1.+0.

Fig. 8.—The Ore Handling Plant.

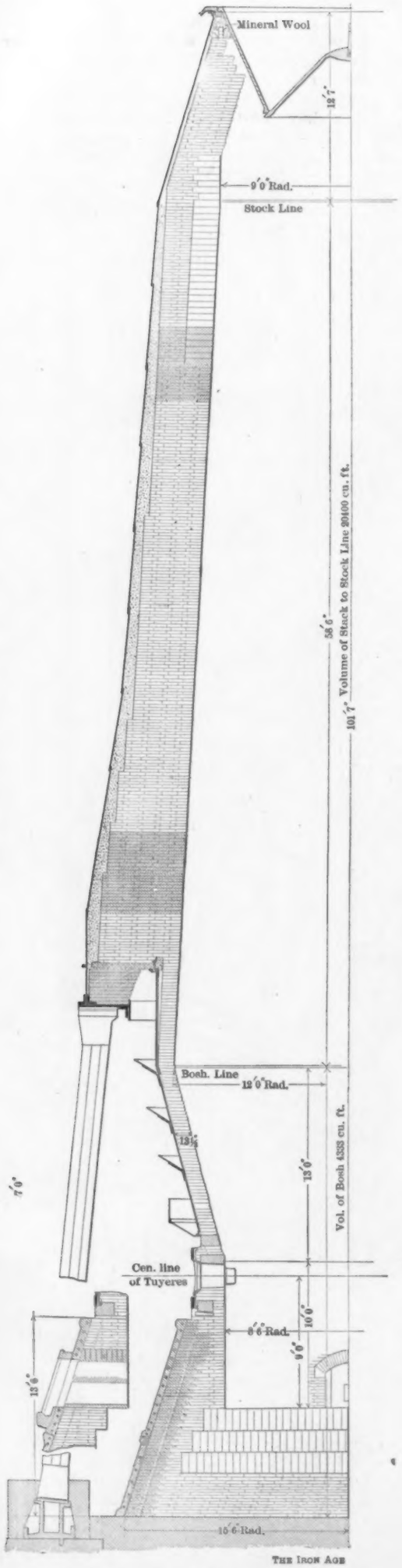


Fig. 9.—Section of Furnaces 3, 4, 5 and 6.

units per cubic foot. The engines have worked well, the only trouble experienced being that due to a sudden increase in the thermal value of the gas caused by leaky tuyeres. The sudden increase in the hydrogen contents of the gas, due to this cause, endangers the engines, sometimes causing breakages. A plan has been adopted at the furnaces which minimizes this danger, although apparently at the sacrifice of tuyeres, which burn out more rapidly.

Of the eight Koerting gas engines in power house No. 1, five drive General Electric 500-kw. three-phase 440-volt alternators, and four drive 500-kw. direct current 250-volt Sprague generators. The gas engines, which were built by the De la Vergne Refrigerating Machine Company of New York, have 24.75-inch power cylinders with 42.35-inch stroke, and run at a speed of 100 revolutions per minute. The gas engines are started by compressed air. They are two-cycle engines, the cylinders, heads, valves and pistons being cooled with water supplied by Lawrence centrifugal pumps driven by Westinghouse induction motors.

In the same power house No. 1 is located a 1000 horse-power Porter-Allen engine, coupled to one of the direct current units, which is held in reserve in the case of a breakdown of the gas engine driven sets. Besides this engine, placed transversely across the building are four Brush arc machines driven by motors and three exciter units for the large machines. A compressor plant for the pneumatic service of the plant consists of four Ingersoll-Sergeant units with 14 x 16 inch steam cylinders and 14.25 x 22.25 by 16 inch air cylinders.

In the same power house are four Bessemer blowing engines, two being 52 x 60 x 60 inch Southwark engines and two 50 x 60 x 60 inch Dickson engines, of which three were moved from the Scranton plants. A series of high-pressure pumps and a Weiss condenser outside the building for the whole steam engine plant complete this installation.

In blowing engine house No. 2 there are now being installed eight gas driven blowing engines, the general arrangement of which is shown in Figs. 14 and 15, the former an elevation and the latter the plan of one engine. The vertical blowing engines, which are of the Southwark type, have 72-inch cylinders and a 60-inch stroke. They are driven by a double cylinder Koerting gas engine, rated at 2000 horse-power, the speed of the engines being 80 revolutions per minute. The power cylinders have a diameter of 38.5 inches, while the stroke is 60 inches, the gas and air pumps having 45.25 inch and 38.25 inch diameters respectively with 49.25-inch stroke.

The fly wheel is 20 feet in diameter with 16-inch face. The building, which is 400 feet long, is commanded by a 35-ton Morgan overhead electric traveling crane of 77-foot span.

The Bessemer Steel Works.

The Bessemer steel works, which have an annual capacity of 1,000,000 tons of ingots, are laid out to use both direct metal from the blast furnaces and remelted

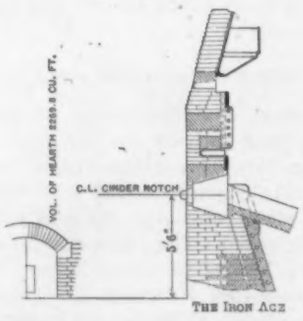
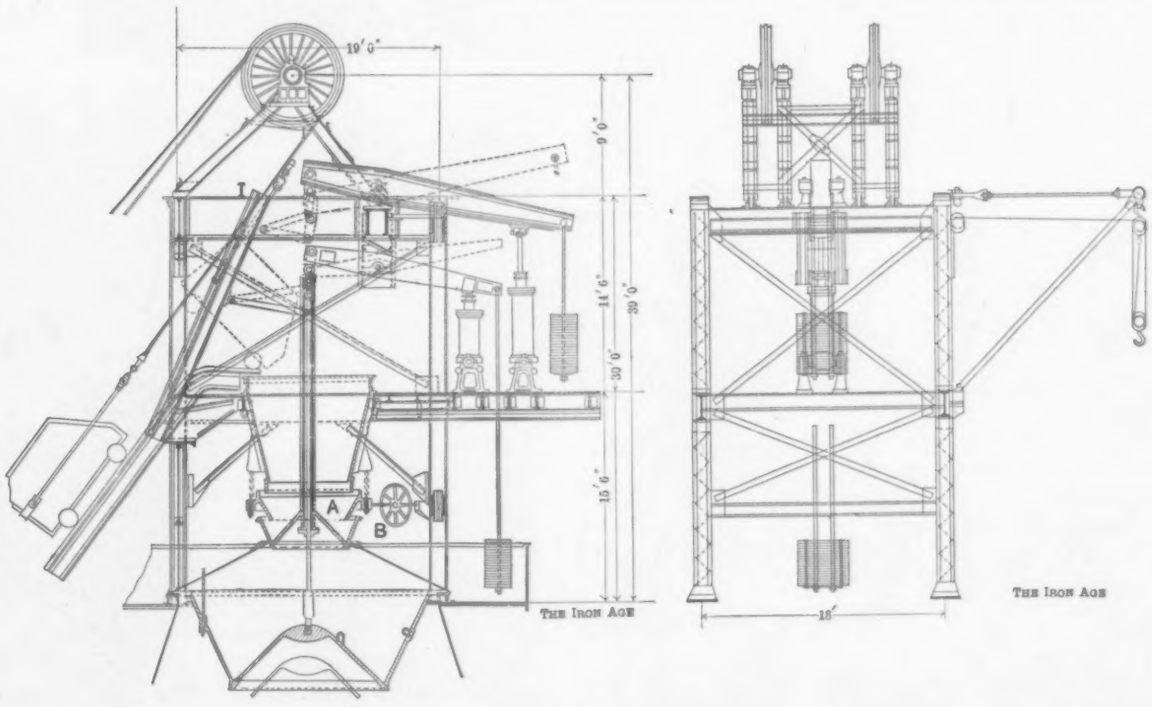


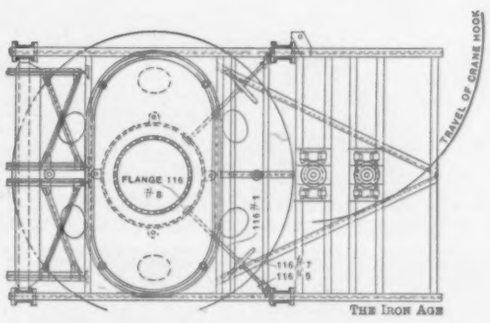
Fig. 10.—Section of Cinder Notch.

pig iron. The general arrangement is shown in the plan, Fig. 20, and the sections, Figs. 21 to 23, while views of the plant are shown in Figs. 16 to 19. The first blow was made on October 20, 1903. Hot metal is brought from the blast furnaces in 25-ton ladles, which are lifted off

the car trucks and hoisted by a wire rope double drum traveling crane, built by the Morgan Engineering Company, to the mixer, which rests on its supports 19 feet above the ground level, where the auxiliary hoist of the crane tips the ladle, and the contents flow into the general opening of the mixer. The mixer has a capacity for storing 300 tons and was designed and built by the Wellman-Seaver-Morgan Engineering Company. It is hydraulically operated, the forward motion for tipping the mixer to pour into the converter ladle being made by a large hydraulic cylinder in the rear, while the return motion is accomplished by a small cylinder in front operating under constant pressure.

The cupola house is a building 255 feet long by 60 feet wide and 66 feet high to the lower chords of the roof trusses. It has three floors, known as the vessel, tapping and charging floors, which are respectively 13.5 feet, 24.5 feet and 54.5 feet above the general level. The melting equipment consists of eight 9-foot iron cupolas and





Figs. 11 *to* 13.—*Elevations and Plan of Furnace Top, with Stock Deflector.*

four 7-foot spiegel cupolas, all aranged in a row along the center line of the building, the spiegel cupolas being at the end nearest the converting department. They are blown by 12 No. 7½ Baker blowers direct connected to 16 x 24 inch vertical engines, running at about 110 revolutions per minute.

The stock is loaded into side dump charging cars in the yard outside and hauled to the elevators at the north end of the cupola house. These elevators are four in number, the two nearest the center of the building being used for hoisting, while the two outer ones are used for returning the empty cars to the stockyard. The loaded cars pass from the hoisting elevators to tracks on the charging floor, where the charges are weighed on track scales, after which the cars are moved along on tracks on either side of the cupolas and are emptied through the charging openings by electrically operated traveling charging machines running on parallel tracks. After the cars are emptied they are pushed to the south end of the building, where a transfer car running on a transverse track conveys them to the tracks at the sides of the building. These tracks lead back to the elevators, which return the empties to the yard for reloading. Owing to conditions which make it desirable at times to use a large percentage of pig iron from the company's furnaces in Pennsylvania, the cupola plant has an unusual capacity.

The melted iron is drawn from the cupolas on the west side into runners, which lead to two openings in the tapping floor. Under these openings the converter ladle car stands on scales which have their beams on the tapping floor, so that the weighmaster is in close touch with the tappers. The iron runners are so laid out that the iron from six cupolas, counting from either end, may be drawn to either opening in the floor. This arrangement of the runners provides ample capacity in the six cupolas, the metal from which is all received into the converter ladle at one point at a given time, and leaves two cupolas off for repairs. The slag which is made in the cupolas is tapped from the east side and runs through openings in the tapping floor to a floor a little above yard level. The slag and cupola drops are loaded onto cars alongside of the building, the floor elevation being made to facilitate this operation.

The metal after entering the converter ladle is conveyed by an electric locomotive to the converter, where it is poured into the vessel by an electric motor on the ladle car. When repairs are required the converters are served by the mixer crane.

The converters, which are four in number, with a rated capacity of 10 tons, are arranged in two pairs 62.5 feet apart, the distance between the vessels in each pair being 19 feet. They are blown under 24 to 26 pounds pressure through 30 tuyeres having 19 15-16 holes by blowing engines located in power house No. 1, which is located nearby on the west side. There are two double blowing engines with 50-inch steam cylinders, 54-inch air cylinders and 60-inch stroke, and two double engines with 52-inch steam cylinders, 60-inch air cylinders and 60-inch stroke, the former running at 25 and the latter at 30 revolutions per minute, making the blowing capacity sufficient to blow two heats at the same time.

On the vessel floor is a manganese furnace having a capacity of 800 pounds per hour and a stopper oven with a capacity for 60 stoppers.

Each pair of vessels is served by a hydraulic ladle

crane located midway between vessels and in front of the converter platform. These cranes are turned by hydraulic power, after the heat is poured, to a position over the first casting track, where the heat is turned into six molds standing on three narrow gauge cars, which are moved along as the casting proceeds by a hydraulic car pusher. The hydraulic power is furnished by eleven 29 x 9 x 36 inch duplex pumps, the number of these pumps in operation at one time being governed by the condition obtaining in the steel works.

The converter house is commanded by two sets of cranes, one above the other, on runways respectively 37 feet, 8 feet and 56 feet 3 inches above the general level. Thed lower craneway commands both the converter house and the ladle house, and has two Morgan overhead electric traveling cranes of 60-foot span, one having a capacity of 20 tons and the other of 40 tons, the latter being available also as a ladle crane. On the upper runway is a 20-ton electric traveling crane, which serves the converter house alone. This crane is employed also to tilt the ladle in casting.

The ladle house, which is 175 feet long and 97.5 feet wide, contains two stone crushers and two clay mills, electrically driven, six bottom ovens, three stands for making up converter bottoms and a number of ladle stands.

Rail Mill No. 1.

The general arrangement of the rail mill No. 1 is shown in the accompanying engravings, Figs. 24 to 28, both inclusive. The hot ingots are brought on the cars from the Bessemer steel work to the strippers, which are in a building adjacent to the pit furnace house. This building is 44 x 50 feet and 51 feet high in the clear, and contains two duplex hydraulic strippers. The distance between the cylinders of each stripper is made to suit the distance between molds on the ingot cars so that two ingots are stripped simultaneously. The molds are transferred by the stripper to empty cars on a side track 7.5 feet from the main track. The rail mill is 1766.5 feet long, and includes the stripper building, the furnace house, the mill proper and the finishing department.

The furnace house adjoining is 162.5 feet long by 60 feet wide and 51 feet high, and contains four furnaces, each having four 5 x 7 feet pits, in each of which are placed six 18.5 x 18.5 inch ingots, making the capacity of the furnaces 96 ingots. The furnace doors are moved by hydraulic cylinders. The reversing air and gas valves are of the Siemens type, the stacks are 75 feet high and 4 feet inside diameter. The gas is furnished by four Frazer-Talbot gas producers built by the Wellman-Seaver-Morgan Engineering Company, situated as shown in the

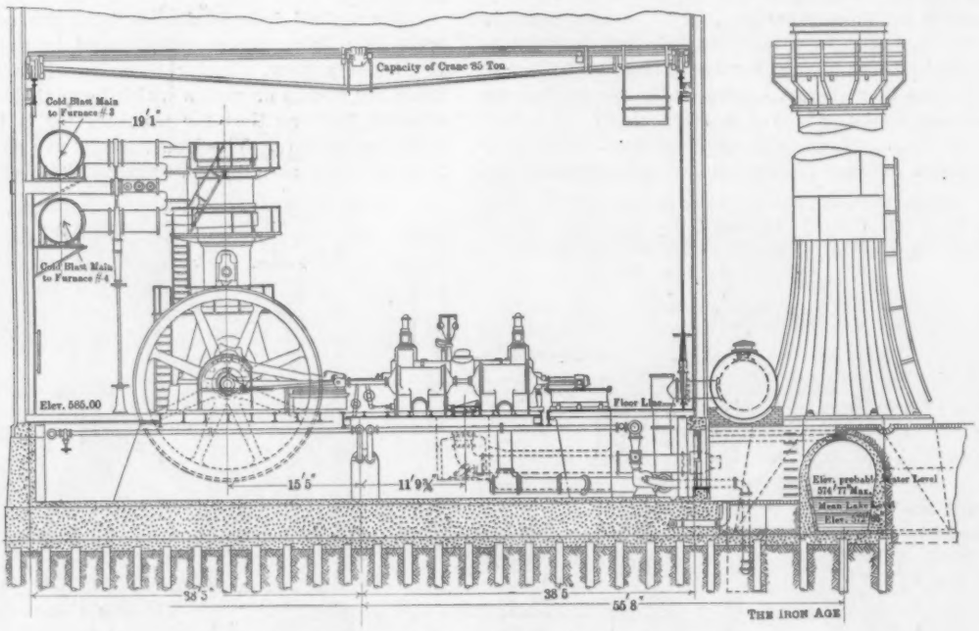


Fig. 14.—Elevation of Gas Engine Driven Blowing Engine.

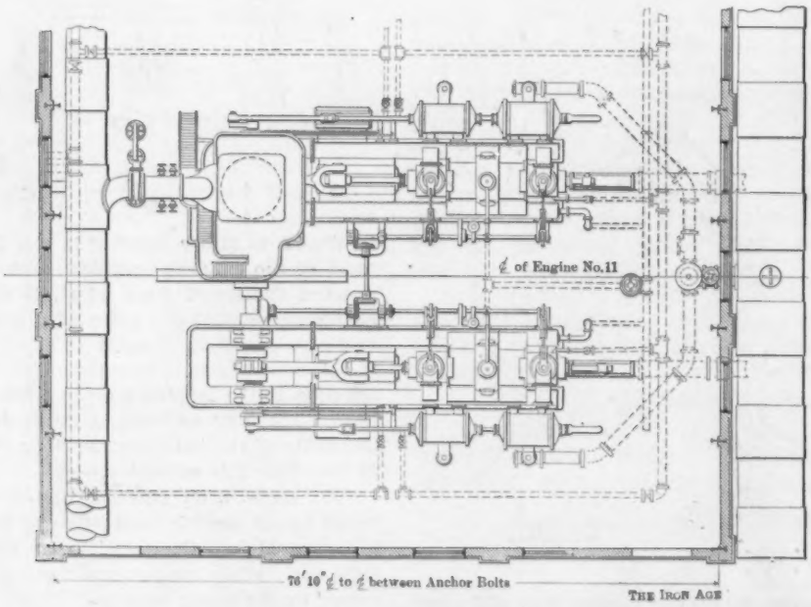


Fig. 15.—Plan of One Unit of Gas Engine Driven Blowing Engine.

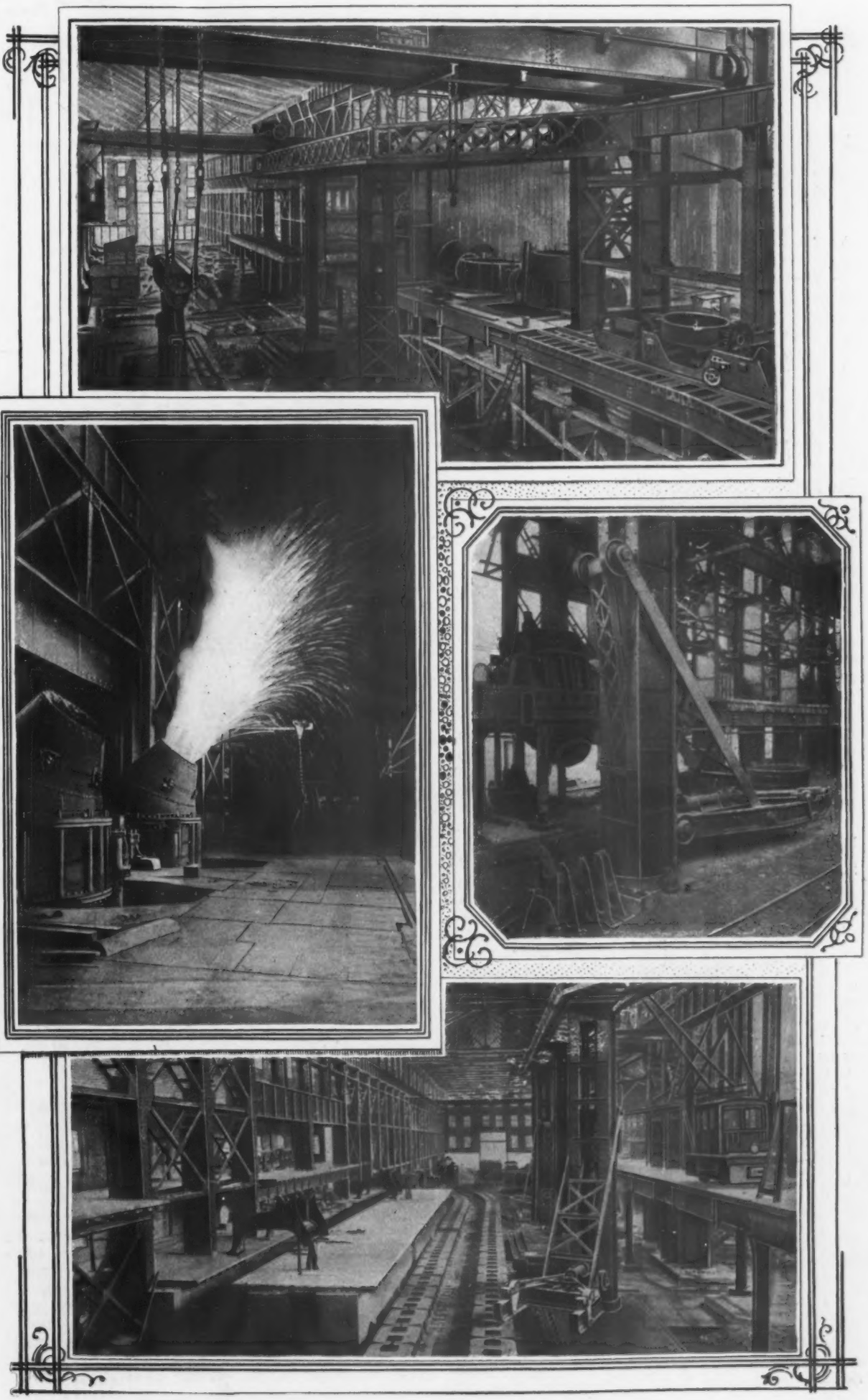


Fig. 16.—Bessemer Steel Plant, Looking South.

Fig. 17.—First Bessemer Blow, October 20, 1903. *Fig. 18.—Hydraulic Bessemer Ladle Crane.*

Fig. 19.—Bessemer Casting Platform.

plan, Fig. 1. The coal for the producers is hoisted by a Heyl & Patterson coal elevator.

After being stripped and weighed on scales at the stripper the ingots are pushed along on cars to a point in the furnace house opposite the furnace in which they are to be charged. The furnaces are served by two Morgan vertical bar type charging cranes having 14-foot lift, which transfer the ingots from the cars to the pits, also from the pits to a chariot, which is pushed by a high speed electric locomotive on a track alongside of the furnaces and leading to the blooming mill, where the ingot is automatically deposited on the table.

The blooming mill, which is of 34.25 inch train line, consists of three stands of two-high rolls placed tandem, the first and second stands having but one pass in each, the third stand having four passes. The first and second stands are 15 feet 1.5 inches center to center, and are connected together by a train of three large gears, the first and third of which are coupled by spindles to the pinions of the first and second blooming respectively, while at the end another smaller gear is coupled to the engine shaft.

These two trains are driven by a pair of 40 x 60 inch Davy reversing engines geared 2 to 1, which in the ordinary course of rolling run continuously in one direction, but have the ability to reverse and back the ingot out in case of emergency. The ingot is automatically turned between the first and second blooming, and the second blooming and the first pass in the third blooming. The third blooming is located 40 feet from No. 2, and here the ingot goes through four passes as stated above, being turned through 90 degrees between each pass by a hydraulic manipulalator. The bloom delivered from this train to the roughing rolls is 8 x 8 inches; or, in other words, the ingot is reduced from 18.5 x 18.5 inches to 8 x 8 inches in six passes. These exceptionally heavy drafts, together with the heavy reductions which the piece receives in the shaping grooves, form one of the explanations of the superior quality of the Lackawanna rails. The shape of the ends of the piece, as it emerges from the passes having these heavy reductions, shows conclusively that the effect of the work on the bar is not confined to the metal near the surface, but reaches to the very center of the piece. The fact that the seconds are running between only 4 and 5 per cent. is the evidence that the method of rolling is unsurpassed.

The bloom after having the front end cropped in the hydraulic shear enters the roughing rolls, which are placed in line with No. 1 blooming from the south side. This train as well as the third blooming is driven by a 40 x 60 inch reversing engine geared 2 to 1, designed by the engineers of the Lackawanna Steel Company, which has some interesting features. In this stand the piece goes through two slabbing and two edging grooves, being turned between each pass through 90 degrees by manipulators, and being sheared at the rear end by a steam shear between the third and fourth passes. The piece then goes directly to the first finishing stand, 299 feet 1.5 inches away, being carried by an independent line of table rollers. The first finishing stand contains one slabbing and three edging passes, and is driven by a pair of 48 x 54 inch Southwark reversing engines, direct connected. No. 2 finishing train is in line with No. 1, and is driven by a pair of 48 x 54 inch Davy reversing engines, direct connected. The piece is brought from the table of the No. 1 finishing train by a mechanical transfer, and is given one pass in the second finishers, after which it is carried by driven rollers to the hot saws, which are three in number, electrically driven and spaced 20 feet apart. The first hot saw is placed 212 feet from the finishing stand.

After sawing the piece passes successively through the stamping and cambering machines to the hot beds, which are four in number, two on either side of the delivery table. These beds are 100 feet long and are electrically operated. They deliver to roller tables at the ends, which convey the rails to transfers outside the hot bed building, which carry the rails to the finishing department. The machinery is this department consists of three roller tables which extend the full length of the building, the two at the sides being the entering tables to which the transfers deliver, and which distribute the rails to the

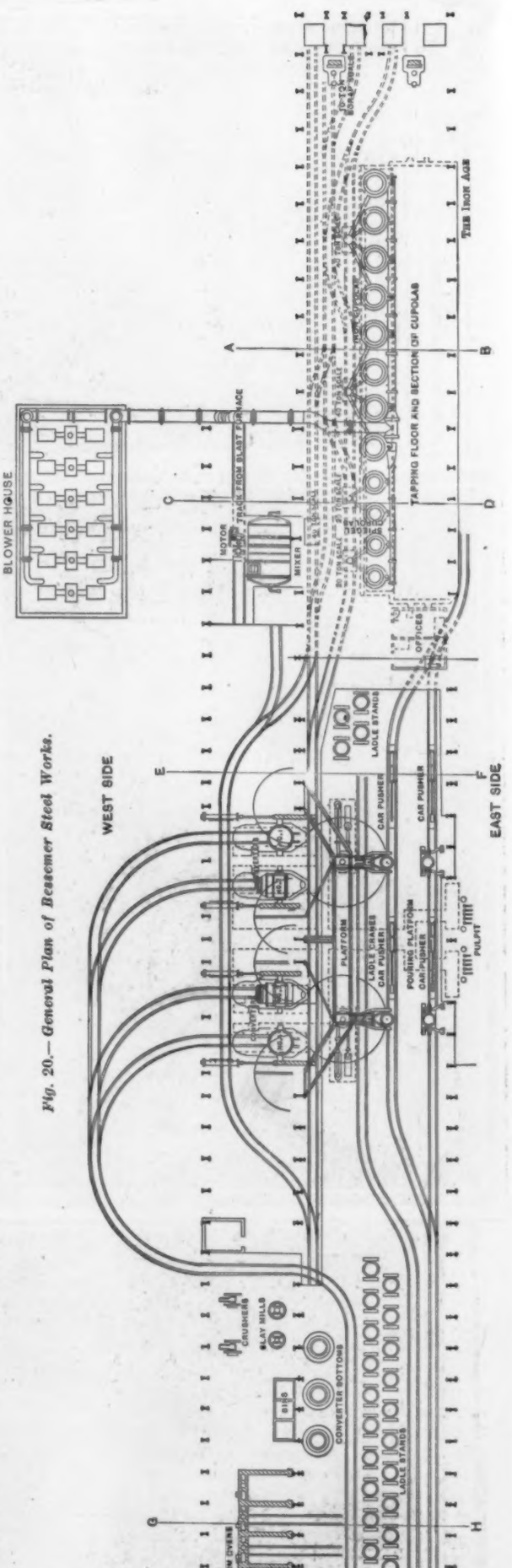


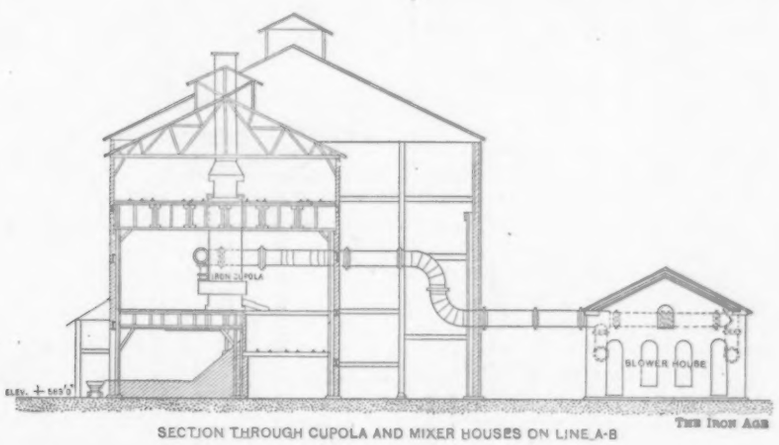
Fig. 20.—General Plan of Bessemer Steel Works.

machines, while the third table extends along the center of the building and carries the finished rails to the loading department. The finishing machinery consists of 11 straightening presses and 22 drills in the main building, and two saws and four drills in a building beyond the loading machines for finishing cuts.

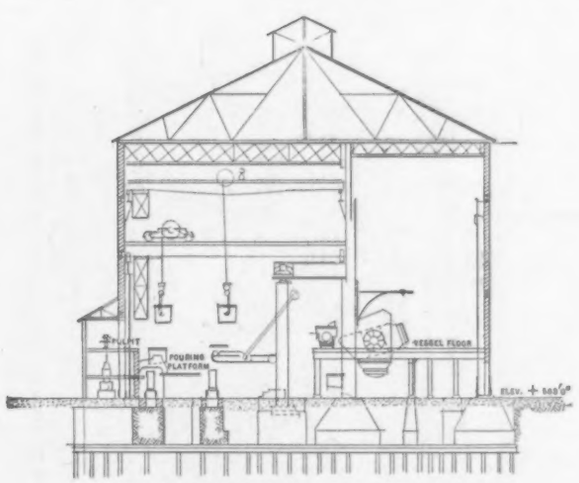
The reversing engines, designed by the engineers of the Lackawanna Steel Company, which drive the third blooming and the roughing trains have interesting special features. Among them is

The Tod Steam Reversing Gear,

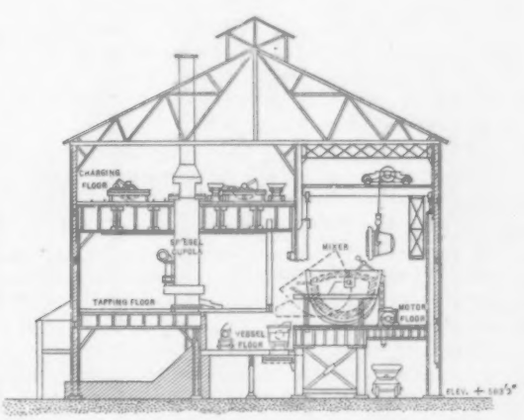
built for the engines by the William Tod Company of Youngstown, Ohio. This steam reversing gear has been used by the William Tod Company in their design of rolling mill engines, as it has been found more satisfactory than the hydraulic gears commonly used. The latter often give trouble, particularly on account of the rapid wearing of ports and valves. In a gear operated by steam or other elastic fluid the position of the piston is not fixed unless it is attached to a positive motion, such as a crank, or is controlled by a piston moving in an incompressible liquid, as oil or glycerine.



SECTION THROUGH CUPOLA AND MIXER HOUSES ON LINE A-B



SECTION THROUGH CONVERTER HOUSE ON LINE E-F



SECTION THROUGH CUPOLA AND MIXER HOUSES ON LINE C-D

Figs. 21 to 23.—Sections through Bessemer Steel Plant.

The accompanying engravings, Figs. 29 and 30, show very clearly the arrangement adopted by the William Tod Company in their design of gear to control the position of the piston in the steam cylinder and make its stroke proportional to the movement of the hand lever. It will be seen that A is a steam cylinder and B an oil cylinder. The steam piston L and oil piston M are connected to a common piston rod. The operation of the gear will be followed most easily if we imagine it to be handled by the operator. Handle H is connected to the pulpit from which the operator controls all the movements of the engine. Let it be supposed that handle H is moved up slightly in the direction of the arrow. As the handle H is connected rigidly to lever P, valve C and the valves of the oil cylinder will be moved to the right, because point E serves as a fulcrum; it will be seen that point E is connected by a rod to lever F, which in turn is connected by links O and cross head N to the pistons L and M. As soon as the valves are moved to the right steam will be admitted to the cylinder A on the right side of the piston, as indicated by the arrow, and steam on the other side of the piston will exhaust through the hollow valve into the pipe marked "exhaust." At the same time the ports of the oil cylinder will have been opened sufficiently to allow oil to flow around from one side of the cylinder to the other; consequently both pistons move to the left, thereby pushing across head M and lever F to the left and raising lever A and links K, which raises the main valve gear and thereby changes the cut off in the engine. As soon as this motion of the main parts to the left commences, rod R, which connects floating lever S to the lever F, is moved to the left, and as lever H is now held in a certain fixed position by the operator, point T serves as a fulcrum, so that valves C and D are returned to their central position; consequently both steam and oil ports are closed, and the motion of the pistons L and M, links O and levers F and K is stopped. Steam will not be admitted again until the operator moves the lever H, and it is thus seen that link V, which controls the direction of rotation and the cut off of the engine, will follow directly the motions of lever H; or, in other words, the motions of the hand of the operator. The resistance to motion, or work to be done by the operator is very small, since he has to move only the small valve C and the corresponding valve of the oil cylinder.

From the elevation it looks as if there was some impossible core work to be done in the reversing and oil cylinders, but it will be clear from the plan that the valve chest is off to one side, and that, therefore, thickness in the elevation appears very much distorted. The resistance which the main valves and the links V offer depends largely on the condition of the surfaces; whether they are dry or well lubricated. The steam cylinder A must, of

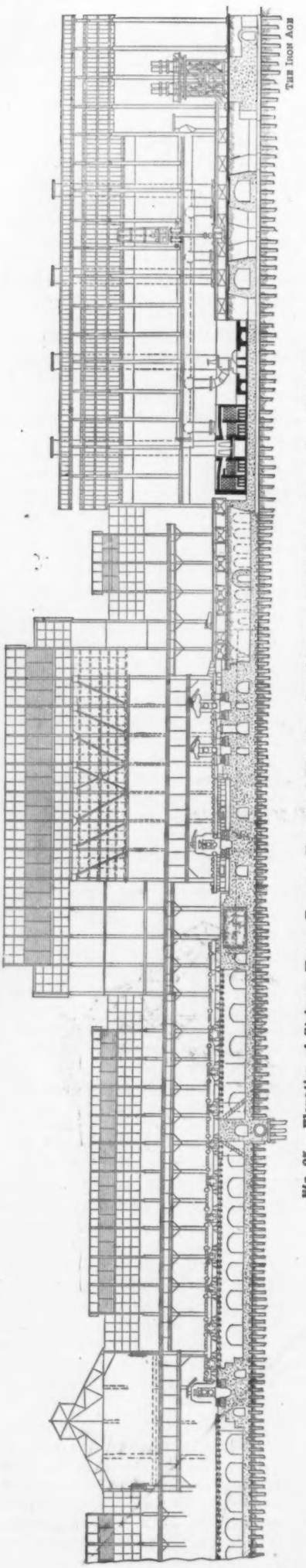


Fig. 25.—Elevation of Stripper House, Furnace House and Blooming, Roughing and Finishing Trains of No. 1 Rail Mill.

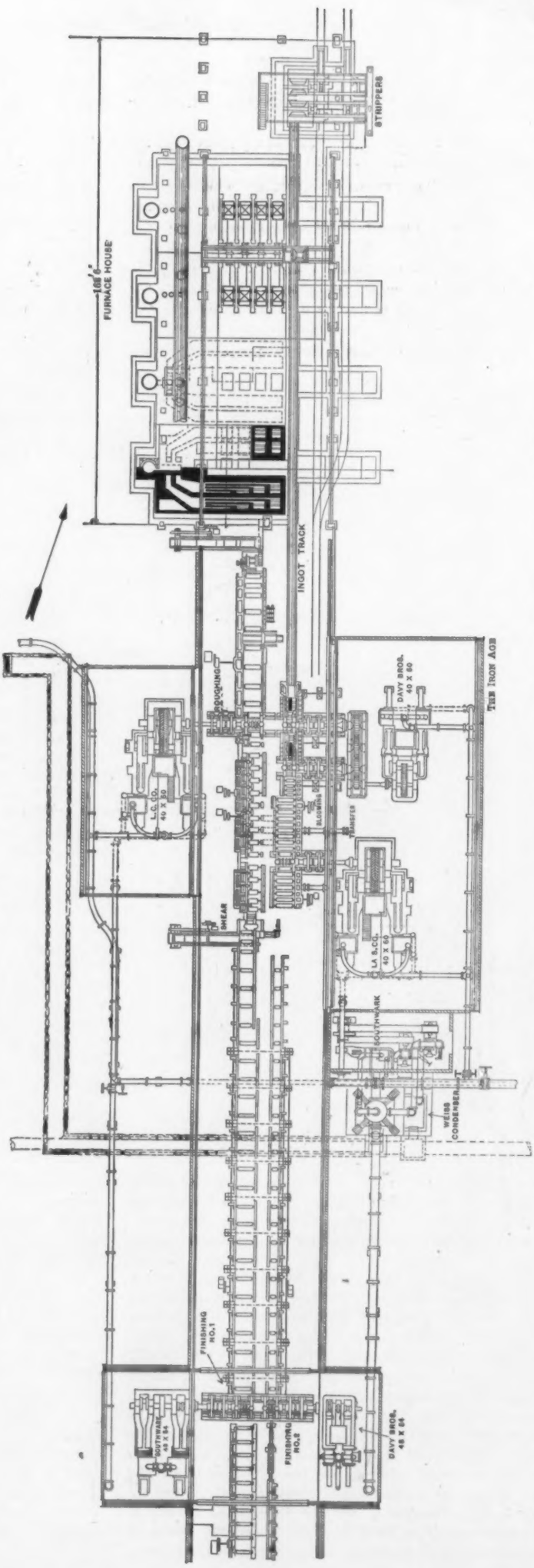


Fig. 24.—Plan of Stripper House, Furnace House and Blooming, Roughing and Finishing Trains of Rail Mill No. 1.

course, be powerful enough to move the valves in their very worst condition; and will, therefore, be too powerful for good working conditions; consequently if no provisions for regulation were made the motions of the pistons L and M, would be too quick and cause slamming action. To avoid this, plugs 1, 2, 3 and 4 have been provided, by means of which the area of the ports can be narrowed down to any desired amount and any desired smoothness of operation be obtained. In order that this reversing gear may work with the same ease both ways, the weight of links V, K and lever I has been counterbalanced by

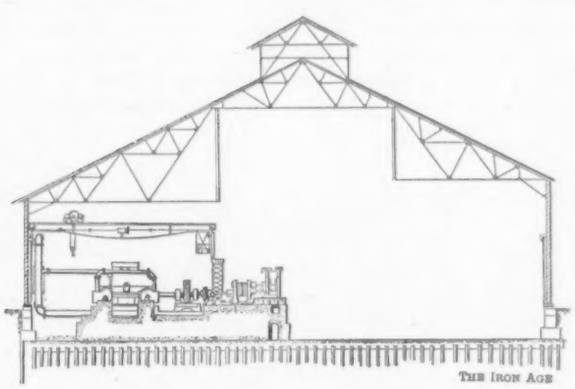


Fig. 26.—Section through Blooming Mill.

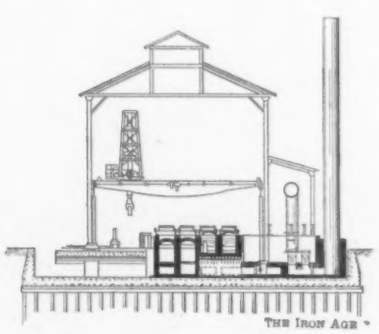


Fig. 27.—Section through Furnace House.

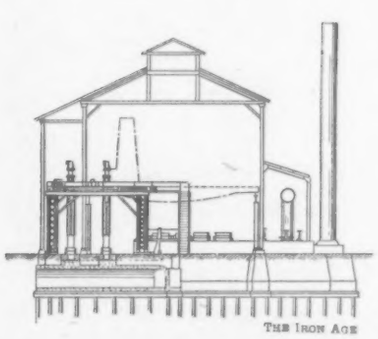


Fig. 28.—Section through Stripper House.

counterweight Q. This type of reversing gear has now been in use for several years, and has proven to be a perfect success in every way.

Rail Mill No. 2 and Structural Mill No. 2.

Rail mill No. 2 and structural mill No. 2 are laid out practically as twin mills, the tables of each being parallel, and the engines driving the mills being on opposite sides. The general arrangement is shown in Fig. 31.

The rail mill No. 2 is designed for rolling rails from 16 to 70 pounds per yard, using blooms, or in the case of the lighter sections rails may be made by rerolling worn out scrap rails of larger size, or seconds made at rail mill No. 1. Splice bars are also to be rolled on this mill.

The No. 2 structural mill is laid out to roll beams and channels from 5 inches up to 15 inches, angles from 2.5 x 2.5 inches up to 8 x 8 inches, and all the standard sizes of Z-bars.

From the ground plan, Fig. 31, it will be observed that the heating furnace equipment for the rail mill consists of one short and two long furnaces, all of the continuous type, which are being designed and built by Alex Laughlin & Co. of Pittsburgh. The long furnaces are for heating blooms and billets, and the short furnace is for heating cuts for rerolling. The structural mill is also served by two Laughlin continuous furnaces, the width of hearths being somewhat greater than that for the rail mill. The gas for these furnaces is supplied by a battery of 16 8-foot Taylor gas producers, equipped with the Bildt feed device, which are arranged in two rows in the producer house a short distance away. The coal for gasifying is elevated and distributed by coal handling machinery furnished by the Aultman Company.

Steel is brought into the furnace house on narrow gauge cars in the rear of the furnaces at either side, and is placed by 5-ton cranes on the skids, over which it is pushed into the furnace by hydraulic pushers of suitable size. The furnaces deliver directly on the table leading to the roughing trains, which in the case of the rail mill consists of one stand of three-high rolls, of 24-inch train line, driven by a 44 x 48 inch Porter-Allen engine. At this stand the bloom goes through seven passes, being handled by vertical lifting tables with automatic manipulators which are operated by compressed air. From the back pass in the roughing rolls the piece travels in a straight line to the finishing train, 212.5 feet distant, which consists of a stand of three-high rolls, equipped with hinged tilting tables, and driven by a 44 x 48 inch Porter-Allen engine, where in five passes it is reduced to a finished rail. The latter passes directly forward to the saw run, where it is cut to length by electrically driven hot saws. The rails now pass through the stamping and cambering machines to either of the two hot beds, which are 99 feet wide and placed in parallel. These hot beds are provided with separate sets of machinery for pulling up and pulling off, so that these operations can be done simultaneously. The hot beds deliver to a table which leads to the finishing department, which is equipped with the usual straightening machines, saws, punches, &c. The finished rail passes out of the building on a roller table and is loaded for shipment. Splice bars are sent to the finishing building some distance away by means of a roller table.

The structural mill, which is being built by the United Engineering & Foundry Company of Pittsburgh, consists of two stands of roughing rolls in line and one stand of finishing rolls located 212.5 feet away. The roughing train is served by a pair of traveling and tilting tables and is driven by a 44 x 66 inch Porter-Allen engine. The finishing train is served by a pair of hinged tilting tables and is driven by a 44 x 48 inch Porter-Allen engine. The train line of this mill is nominally 24 inches, with the middle roll stationary; but the window of the housing is so designed that a set of 26-inch rolls can be used for rolling the larger sizes of structural material. The tables for this mill, including all from the furnace house to the hot beds, are being built by the Morgan Engineering Company. The finishing mill delivers to two beds 100 feet long by 60 feet wide, arranged in parallel. These beds are equipped with independent pull up and pull off devices and the usual device for turning beams on the flanges to cool. The beds deliver by a roller table to an adjacent stockyard, which consists of two areas each covered by 100-foot span cranes and two areas covered by 110-foot span cranes. A portion of the structural material will be straightened as it leaves the hot beds by a roller straightener built by the Brodisser Elevator Mfg. Company of Milwaukee, but the heavier sections will be straightened by a press made by the Hilles & Jones Company of Wilmington. The eastern portion of the stockyard will be laid out with marking and shipping beds, with excellent facilities for cutting to the required lengths and loading on cars.

In general, all the floor space in the mill building is covered by traveling cranes, the only portion uncovered being where very little material is likely to be handled—namely, the middle section of the continuous furnace

house, and the hot bed and finishing buildings. The cranes in the mill buildings proper have capacity enough to enable them to lift a stand of rolls set up in the housings complete with guides, rest bars, &c.

The steam for running the mill engines is to be brought from the Nos. 2 and 3 boiler houses at the blast furnace plant. The mill engines are running condesing, this being taken care of by a No. XV Weiss condenser with pump, &c., of suitable size. All the table rollers are driven by electric motors, and all the other machinery is operated by motors or compressed air, with the single exception of the pushers for the continuous furnaces.

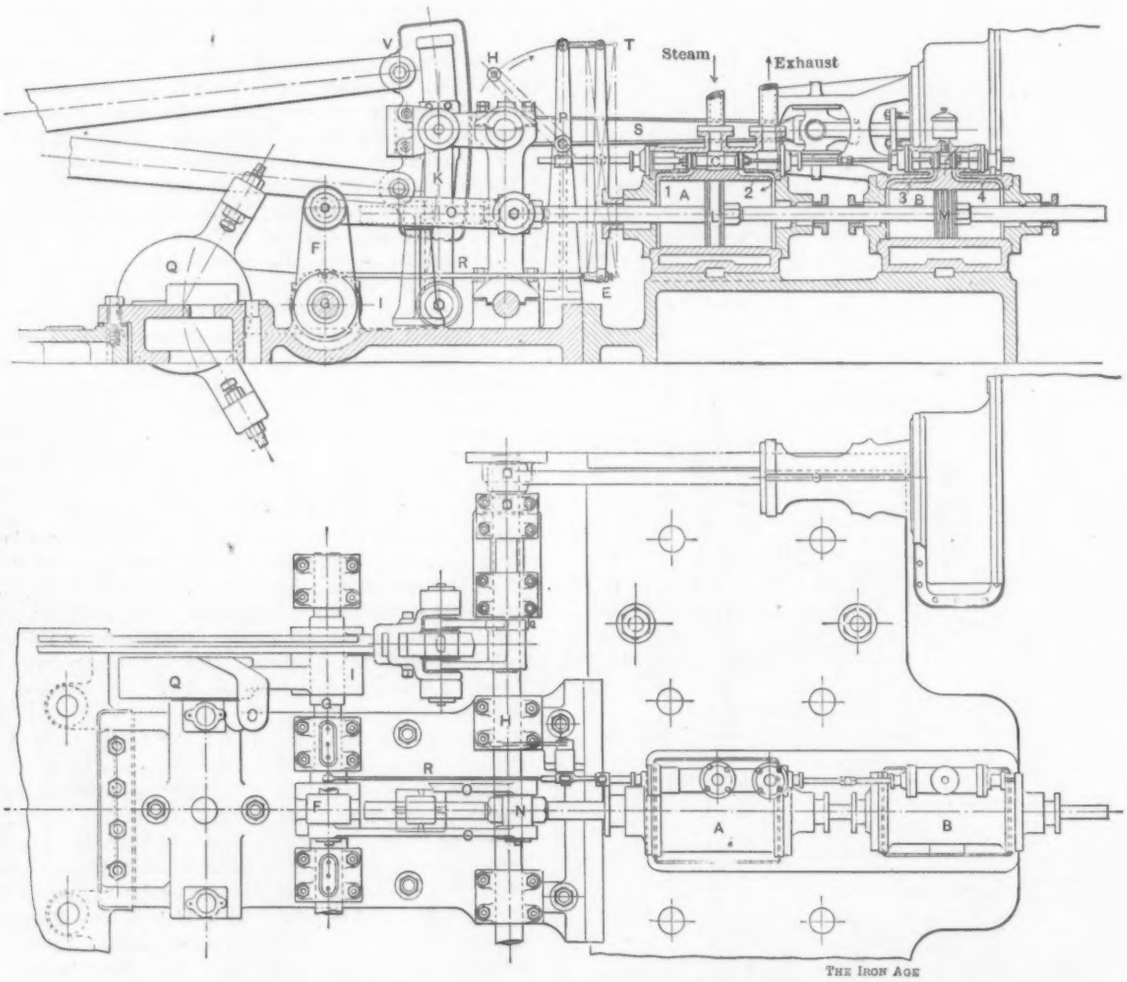
The Slabbing Mill.

The product of the open hearth steel works will be hauled on eight-wheel casting cars to the stripper, which is located near the pit furnace house. This stripper is an electrically driven machine capable of exerting a stripping pressure of 200 tons through the main screws, while the rope lifting arrangement for the transferring of the molds is capable of lifting 20 tons. The machine takes the form of a traveling crane and runs on a crane runway of 40 feet span by 48 feet long. The arrangement of tracks is such that two trains of loaded cars and two trains of empties can be under the stripper at the same time.

After stripping the ingots are pushed into the pit furnace house of the 32-inch slabbing mill on cars, from which they are transferred to the pits by the 20-ton bar type vertical charging machines, designed and built by the Morgan Engineering Company. The heating equipment of this mill consists of four furnaces, each having four pits 5 x 7.25 feet, making 16 pits, with space reserved for doubling the number of furnaces.

The furnaces are of the usual soaking pit type, with extra deep regenerators, are equipped with air cylinders for moving the doors, Forter reversing air and gas valves. The stacks are 4 feet in diameter and 100 feet high.

After being heated in the pit, the ingot is placed by the charging machine in an electrically driven chariot which conveys it to the end of the receiving table in front of the mill table proper. The ingot is now lifted into the table by a hydraulic tilter, and in case the rolling of the previous ingot has not been completed, it is held on the receiving table until the preceding ingot has entered for the last pass, when it is brought forward for rolling. Thus the minimum amount of time is lost between ingots. The receiving table is motor driven, while the main mill tables are driven by 12 x 12 inch Crane reversing engines. The 32-inch slabbing mill and tables are being designed and built by Mackintosh, Hemphill & Co., and in point of weight and massive construction surpass anything that has ever been built in this type of mill. It is enough to say that the mill housings are 17 feet 1 inch in length, 10 feet 10 inches in width, and weigh upward of 60 tons.



Figs. 29 and 30.—Plan and Elevation of Reversing Gear, William Tod Company.

The mill is capable of rolling slabs from the dimensions of the extreme opening of the rolls, 30 x 54 inches, down to 2 x 18 inches. The principal features of the mill, aside from its great massiveness, are the screw down arrangement and the roll charging device. The screw down of the horizontal rolls is driven by a motor, geared to a countershaft, which is fitted with a jaw clutch which is operated by a small air cylinder. This clutch engages at the will of the operator with a slow speed train of gears for screwing the rolls down, or, when the rolls are to be lifted to receive another ingot, with a fast speed train, so that the minimum length of time is required for raising the rolls. The roll changing is effected by lifting the rolls by the top roll balancing cylinders, which are attached at the upper part of the housings, placing them on a buggy which runs in a carriage which has a cantilever extension which reaches into the window of the housing. The entering side of the table is equipped with a hydraulic manipulator, so that in case of necessity ingots can be bloomed as well as slabbed.

The motive power for the horizontal rolls is furnished

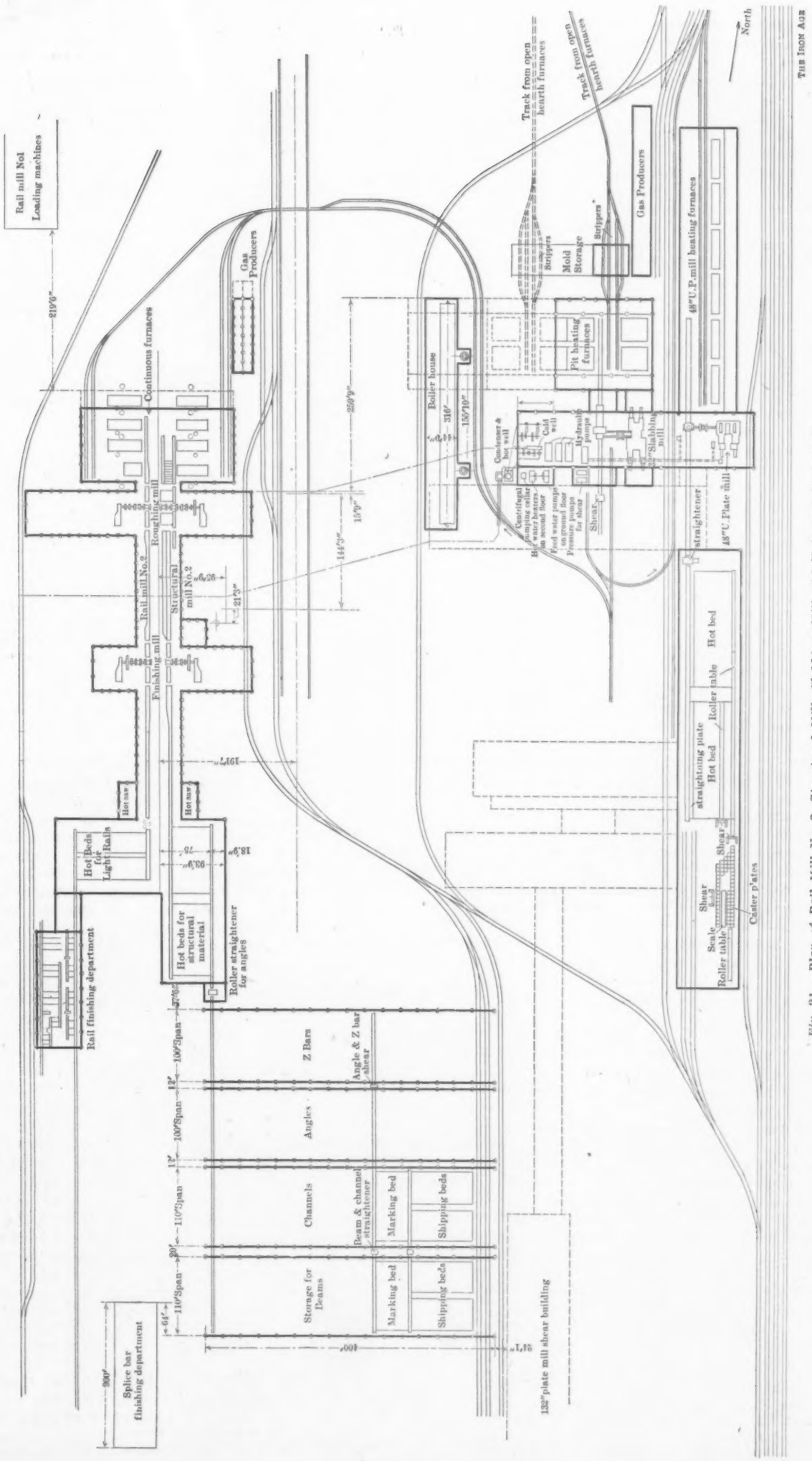


Fig. 31.—Plan of Rail Mill No. 2, Structural Mill, Slabbing Mill and Universal Plate Mill.

by a pair of 46 x 60 inch reversing engines, geared to the mill shaft with a ratio of 2.25 to 1, while the vertical rolls are driven by a pair of 36 x 48 inch reversing engines geared 1.5 to 1. These engines are both placed on the same side of the mill, the bed plates being tied together and resting on the same foundation. These engines are being designed and built by Mackintosh, Hemphill & Co. The slab after leaving the mill is carried by a roller table to a 3000-ton hydraulic shear, where it is cut to length for shipment or for rolling in the 48-inch universal plate mill. This shear is being designed and built by the Bethlehem Steel Company and is to be operated by water taken direct from steel pumps, which are capable of developing a hydraulic pressure of 6000 pounds per square inch, and which are also being furnished by the same company. The shear is fitted with a hydraulic slab pusher, which has some novel features. The general arrangement of this mill is shown in the plan, Fig. 31.

The 48-inch Universal Plate Mills.

After being cut the slabs are loaded on cars by a jib crane and conveyed to the furnace house of the 48-inch universal plate mill. This furnace house contains six heating furnaces arranged in a row, 37.5 feet centers, each having a hearth 8.5 x 36.25 feet, with four 6-foot doors with water cooled backs, jambs, lintels and fore-plates. The furnaces are built with exceptionally large regenerators, equipped with 24-inch Forter reversing air and gas valves, and have stacks 4 feet in diameter by 100 feet high. The furnaces are served by two 10-ton side grip horizontal charging machines, designed and built by the Morgan Engineering Company. These machines both charge and draw. In the former process they lift the car to the furnace, and in the latter they lift from the furnace to an electrically driven car which runs the entire length of the furnace house and comes up close alongside of the mill table, where it stops in front of a pusher, which is operated by compressed air, and which transfers the ingot from the car to the table at a point close by the mill. The mill and engines driving the same are being designed and built by Mackintosh, Hemphill & Co., while the mill tables are being built by the Wellman-Seaver-Morgan Engineering Company.

The mill has 30-inch horizontal rolls and two sets of 17.5-inch vertical rolls, all driven through suitable gearing from a pair of 55 x 60 inch direct connected reversing engines. The screw down for all rolls is effected by electric motors and suitable gearing. The mill tables are driven by 12 x 4 inch Crane reversing engines.

The approach and delivery tables are motor driven. After rolling the plates are delivered to a roller straightening machine built by R. S. Newbold & Sons, passing which they are carried to the side straightening plates and hot beds, which are being designed and built by Henry Aiken of Pittsburgh. The hot beds are two in number, 160 feet long, and receive the plates from the run out tables, but each bed has its own delivery table to the shears, which cut the plates to length. Another trimming shear a short distance away is provided for splitting or making sk tch plates. These shears are being designed and built by the Morgan Engineering Company and are driven by alternate current motors. All the hot bed machinery is motor driven except the chain lifting devices, which are operated by air cylinders.

The plate and slabbing mills are located in the same building, 75 feet span by 330 feet long and 50 feet to the underside of chord of roof trusses. They are covered by two Morgan cranes with 75-ton main and 25-ton auxiliary hoists. The hot beds and shears are covered by two 10-ton double driven cranes for shipping plates. The producer plant for these mills is being designed and built by the Morgan Construction Company and consists of 16 Morgan continuous producers with George automatic feeders. The coal is elevated by a Heyl & Patterson elevator to a bin of 380 tons capacity, from which it is distributed to the producers by a traveling crane, which has a weighing device so that the coal gasified in each producer can be accounted for. Proper provision is also made for handling the ashes from the producers by machinery. The hydraulic pressure system consists of three 25 x 42 inch steam, 10-inch hydraulic plungers, 36-inch stroke pumps furnished by Wilson-Snyder Mfg. Company, working in connection with steam accumulators.

The top rolls of both mills are balanced by individual accumulators which are filled from the general system.

The steam for these mills is generated by a battery of 20 Munoz boilers. The mill engines are to be run condensing, being connected to a No. XVIII Weiss condenser with the accessory pumping machinery. The feed water for the boilers is drawn from the hot well by centrifugal pumps, which deliver to tanks storing for a 12,000 horse-power Sorge-Cochrane heating and purifying plant. The water from this plant is pumped direct to the boilers.

The Merchant Bar Mill.

The Morgan Construction Company of Worcester, Mass,. are building for the company a merchant bar mill, which is being located at the place shown in the general plan. It will be a combination 16-inch and 12-inch three-high mill driven by a set of Allis-Chalmers horizontal vertical engine of 1500 horse-power, served by four 350 horse-power Munoz boilers. There will be two Morgan continuous furnaces and mechanical hot beds. The mill will have an annual capacity of 75,000 tons.

Open Hearth Steel Works.

Work has begun on the open hearth plant, which is to serve the slabbing and plate mills. To begin with six stationary 50-ton furnaces are now being built, which will be completed in time to partly supply these mills. Later on the open hearth plant is to be greatly extended.

The Machine Shop.

The machine shop is 300 feet long by 86 feet wide. The building is of steel construction with 8-inch brick walls. It consists of a main aisle 45 feet wide and side aisles each 20.5 feet wide. The main aisle is commanded by two Morgan electric traveling cranes, one of 30 and one of 20 tons capacity. The side aisles are commanded by 5-ton electric traveling cranes, which travel the full length of the building. The main aisle columns are designed to resist the stresses due to bracket cranes of 5000 pounds capacity and 10 feet radius.

The shop is heated by a hot blast system, as installed by the Buffalo Forge Company. The apparatus is in two units, one at each end of the building, located on platforms in the side aisles. The air ducts discharge into the main aisle of the shop. The shop equipment consists of the ordinary assortment of machine tools, which are driven in most cases by individual motors. The large machines are located in the main aisle, the smaller machines in the side aisles. Among the larger machines may be mentioned a Pond planer, which will plane 10 feet wide by 10 feet high by 30 feet long; a Niles boring mill, which will take work 20 feet in diameter by 14 feet high, and two Jones & Lamson flat turret lathes, arranged to be driven by motors. The tool room equipment consists of a Becker-Brainard No. 11½ universal mill machine and a Brown & Sharpe universal grinder and the usual tool room equipment.

By a system of broad and narrow gauge tracks the materials can be readily transferred to and from the machine shop to the various other shop buildings.

The plant is equipped with a large foundry, which has served to produce a goodly part of the castings during the building of the plant. It has one 8-foot and one 5-foot cupola.

The Forge Shop.

The forge shop is 250 feet long by 70 feet wide. The frame of the building is of steel construction with 8-inch brick walls. The main trusses are designed to carry a load of 20,000 pounds at any point. The main floor, on which are located the forges and steam hammers and various other equipment, is 50 feet wide. In the 20-foot lean-to, which extends the whole length of the building, are located the iron storage racks, the heating furnaces and the coal storage bins.

The equipment includes one 700-pound, one 1150-pound, one 1½-ton steam hammers, and one 7-ton drop hammer. The 1150-pound hammer is served by two 1-ton bracket cranes. The 1½-ton hammer is served by a 2-ton bracket crane and a 3-ton jib crane. The 7-ton hammer is served

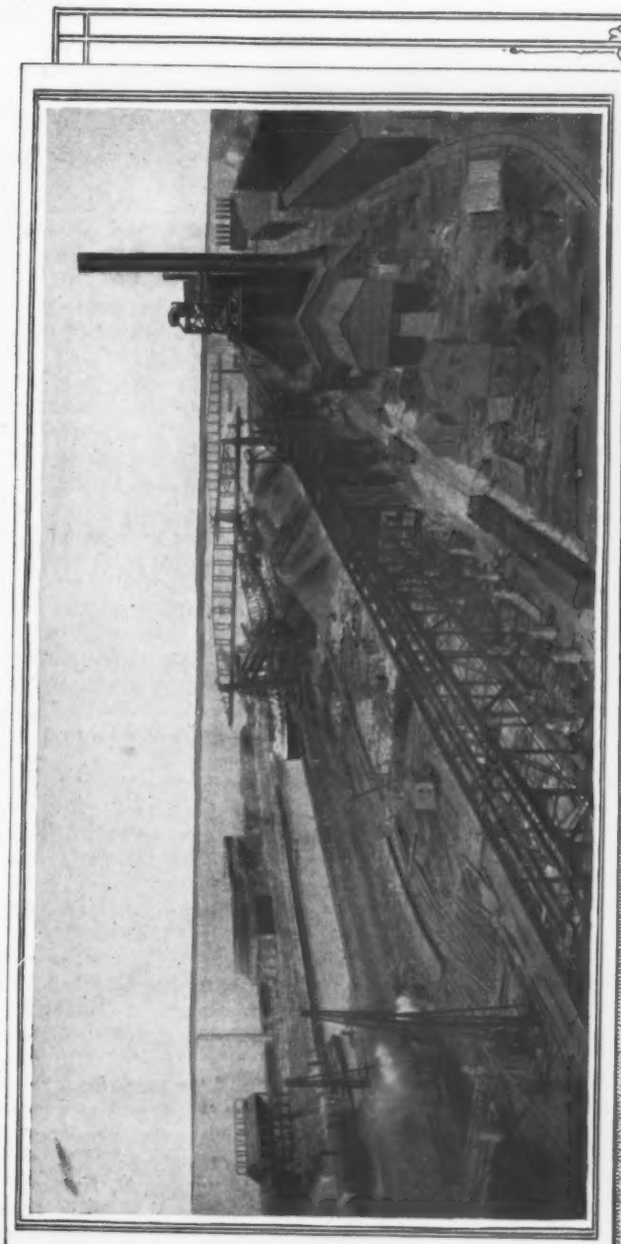


Fig. 32.—Incline, Furnace No. 3.

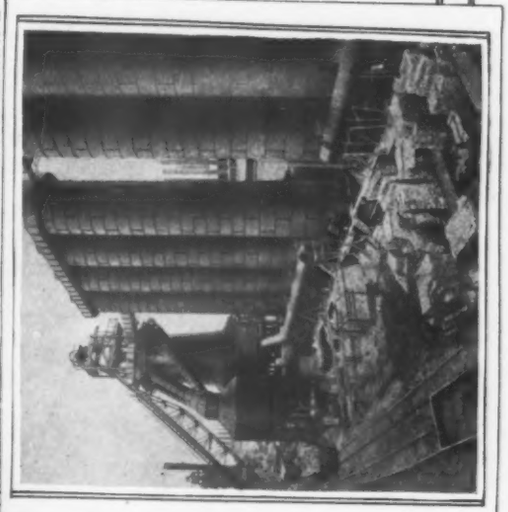


Fig. 33.—View from Top of Stoves of Blast Furnace No. 5.

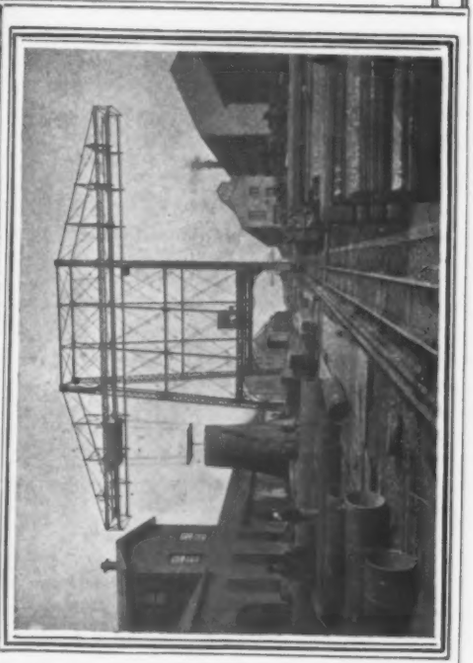


Fig. 35.—Five-Ton High Speed Gantry.

Fig. 34.—Gantry Crane for Bessemer House Stockyard.

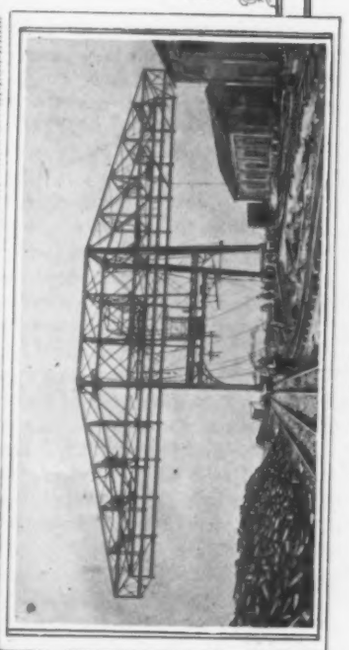


Fig. 36.—Blast Furnace No. 3.

by a 5-ton jib crane. Near the 7-ton hammer in the lean-to is located a heating furnace. The 3 and 5 ton jib cranes are arranged to take iron from this furnace to either the 1½ or 7 ton hammers.

The north end of the building was designed for a plate flanging shop, and is commanded by a 5-ton Whiting Foundry Equipment Company electric traveling crane. In the lean-to at this end of the building a furnace is located for heating the larger plates. On the main floor are a number of smaller plate heating furnaces.

Air blast for the various forges and furnaces is furnished by a fan, which is located on a platform suspended from the roof trusses at one side of the main floor. The smoke from the forges and the small heating furnaces is removed by a down draft system installed by the Buffalo Forge Company.

Among the other shops are a plate shop with a gantry equipped with a lifting magnet, a bridge shop, pattern shop, pattern storage building, carpenter shop, store house and roll shop.

The pump house contains five duplex triple expansion Wilson-Snyder pumps, 15 x 24 x 42 x 21 x 30 inches, with a capacity of 5,000,000 gallons each, the exhaust steam going to a Weiss condenser outside of the building.

An impressive boiler house is that adjoining furnaces Nos. 3 and 4. It contains 80 Cahall boilers, each rated at 250 horse-power each. They have 102 tubes, 4 inches in diameter, having a heating surface of 2536 square feet, each having an independent stack. They supply steam for the steel works and rail mills. Another boiler house, No. 3 is to be built adjacent to furnaces 5 and 6. It will contain 32 Cahall boilers.

A shown in the plan, gantries have been adopted to a very considerable extent for the handling of materials. The Bessemer house stockyard is commanded by a gantry, a general view of which is shown in Fig. 34. Two high speed 5-ton gantries and a 30-ton gantry sweep the entire length of the plant along the space marked in the general plan, Fig. 1, gantry runway; and an elaborate system of broad and narrow guage tracks serve the different shops and mills. The 30-ton gantry has a 40-foot span, the 5-ton gantries, of the same span, have 47½-foot cantilevers on each side, while another 10-ton gantry has 60-foot cantilevers on each side. All of them are electrically operated.

The order restraining the Electric Appliance Company of Chicago from selling or manufacturing the Gutmann recording wattmeter, which was granted last week on *ex parate* application of the Westinghouse Electric & Mfg. Company, was continued on December 29 by Judge Kohlsaat of the United States Circuit Court after a hearing. The action is based upon a suit brought in Philadelphia, in which the Sangamo Electric Company of Springfield, Ill., the manufacturers of the Gutmann meter, intervened and became the defendants. In that action, it was decided that the Gutmann meter was an infringement of the Tesla patents on the rotating magnetic field of the split phase type which belong to the Westinghouse Company. After an injunction was issued, it was discovered that the Sangamo Company were making a meter in which a slotted disk was substituted for the slotted cylinder before used. The Sangamo Company asked to have the injunction suspended as to this form, but this was refused. An application was made to have the Sangamo Company declared in contempt, but it was shown that at that time their factory was closed and no meters were being made. The contempt proceedings have not been decided. Later it was found that a large number of the disk meters had been sent to the Electric Appliance Company of Chicago, who were selling them. The restraining order which has now been continued was then applied for.

E. Stuetz, representative of the Goldschmidt thermit process, of 54 Front street, New York, is now in a position to supply thermit and appliances, such as crucibles, &c., from stock in New York.

Coke in 1903.

BY E. W. PARKER, WASHINGTON.

In the opening months of 1903 the prospects for a year of activity which would exceed the record made in 1902 were very promising. Production was well up to capacity, and demand kept pretty even with production, while the fancy prices of 1902 added to the satisfaction experienced by coke producers generally. These conditions continued during the first six months of the year, and as late as June it was reported that contracts for Connellsville furnace coke had been made at $3.25 per ton for delivery during the third quarter of the year. Premonitory signs of the coming change were observed in July, but few expected the complete slump which followed. The reaction in the iron trade with which the readers of *The Iron Age* are familiar was reflected almost immediately upon the manufacture of coke, conditions going from bad to worse during the last six months of the year, and operators finding the trade as much demoralized in the second half as it was promising and satisfactory during the first half. The production from January 1 to July 1 was well up to that for a similar period in 1902, but fell off rapidly after that time. So bad had conditions become by October that in the Connellsville region more than 6000 ovens had been put out of blast. This was equivalent to a reduction in productive capacity of about 30 per cent. A similar decrease in production took place in the Pocahontas region of West Virginia. Other districts suffered even worse. The New River district fell off from 33,900 tons in April to 17,820 tons in November. The Kanawha district shipped only 3600 tons in November, as compared with 17,580 tons in January. In the Fairmount region the production in the last three months of the year was only a little over 20 per cent. of what it was in January, February and March.

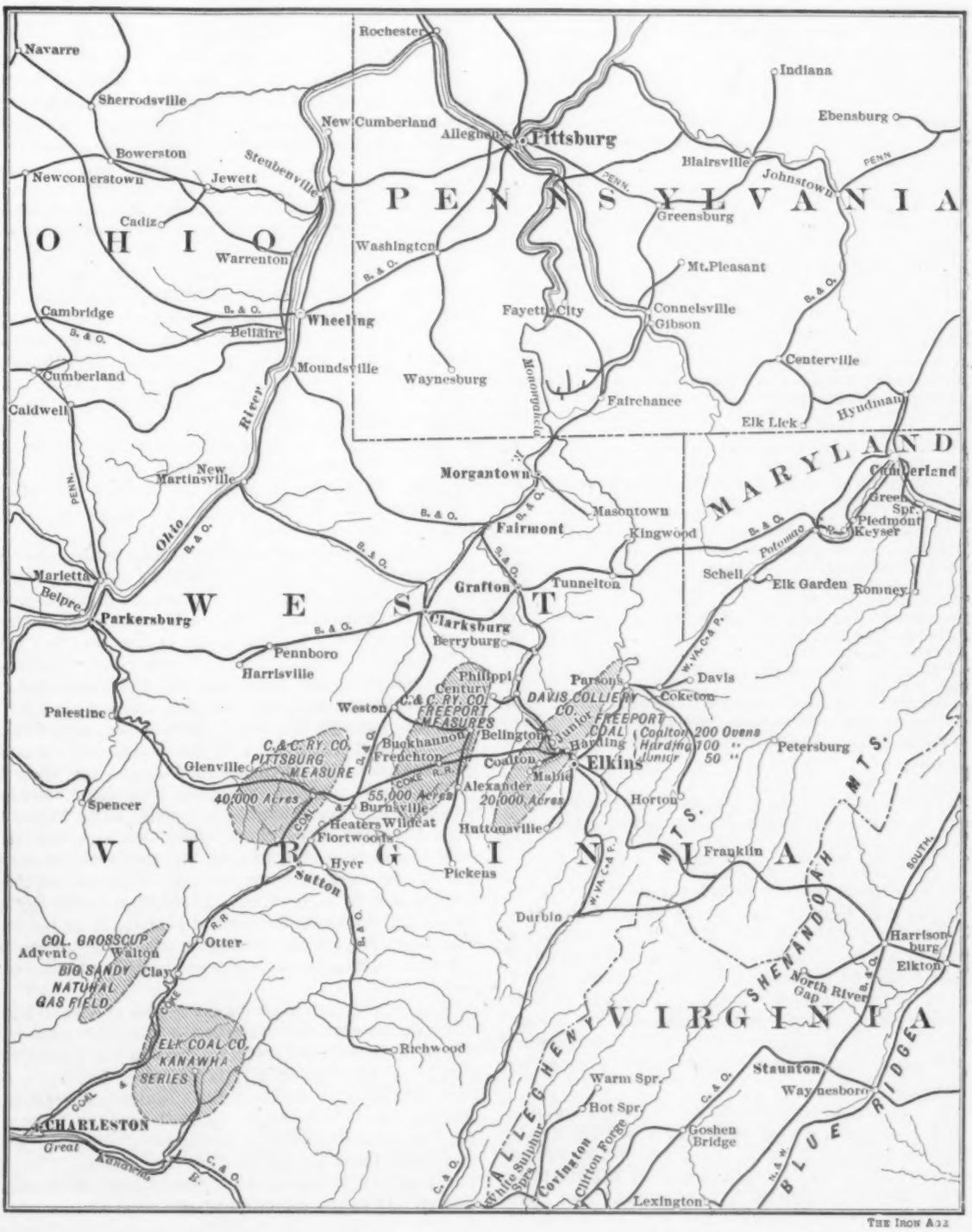
The prices of Connellsville coke, which is the recognized standard of the United States, may be taken as indicative of the general trend of coke prices. In fact, it is the only coke upon which prices are quoted regularly in the trade journals. As previously stated, fancy figures were quoted and obtained early in the year, furnace coke being quoted at $5 a ton, with foundry at $6.50, for prompt delivery, while contracts for six months were made at $3.75 to $4 for furnace and at $4.75 to $5 for foundry. By April prices had shaded off somewhat, furnace for prompt shipment being quoted at from $4 to $4.50, and 72-hour foundry at from $5.50 to $6, with contracts made at $3.75 for furnace and $5 for foundry coke. Further declines were noted in May and June, and by July 1 furnace coke was being sold on contracts for six months at $2.75 for furnace and $3.25 to $3.50 for foundry. In August prices fell to $2 to $2.50 for furnace, with foundry at $3. These prices continued to be quoted during September, though considerable coke was sold below the quotations. By the latter part of October furnace coke had fallen to $1.75 to $2, with foundry 75 cents higher. Some attempts were made by the producers to come to an agreement and maintain prices, but if these met with any success it was not apparent. At one meeting held in Uniontown on October 24 it was agreed that no furnace coke should be sold for less than $1.90 and no foundry coke for less than $2.75. On November 26 strictly Connellsville furnace coke was freely offered at $1.65 for prompt delivery and 72-hour foundry was quoted at $2.50 to $2.65. In December it is stated that furnace coke was sold as low as $1.45. By the middle of December 60 per cent. of the ovens in the Connellsville region were out of blast.

Development Work.

Although the latter half of the year was so disastrous, a large amount of development work was carried forward, as will be seen by the following record of work in the principal producing States:

Pennsylvania.—Pennsylvania is by far the most important State in the manufacture of coke, as it is in the production of coal. About two-thirds of the total coke product of the United States is made in Pennsylvania, and about 75 per cent. of the State's total, or 50 per cent. of the output of the entire country, is produced in the Con-

nellsville region. During the first eight or nine months of 1903 there was general activity throughout the coking regions of the State, both in the production of coke and in the development of new territory. New construction was particularly active in the Connellsville region and in the recently developed "Klondike," or Lower Connellsville district. Until the slump in the iron and steel trade occurred in the fall of the year the indications were that



THE IRON AGE

MAP OF WEST VIRGINIA, SHOWING ROUTE OF THE COAL & COKE RAILWAY AND COAL FIELDS OWNED BY IT AND ALLIED INTERESTS.

the coke production for 1903 would show a decided gain over the record product of the previous year. The rather sudden falling off in demand during the last quarter of the year compelled the shutting down of a large number of ovens, and production decreased so markedly that the returns for 1903 will probably show a production no larger than that of 1902, if, indeed, it does not fall considerably below it. The large amount of new territory purchased and the new construction begun or contemplated in the earlier months of 1903 indicate that the later depression in the coke trade was as unexpected as it was unwelcome. In 1902 the announcement was made that the H. C. Frick Coke Company, the largest producer of coke in the Connellsville region, had withdrawn from the general trade and would supply coke only to the furnaces of their allied interests in the United States Steel Corporation. On November 2, 1903, the Frick Company again entered the market, offering 72-hour coke, which, during the summer, sold for from $3.50 to $4.50, at $2.65 per ton. The year closed with the Connellsville coke trade in a demoralized condition and operators making strenuous efforts to pool interests and maintain prices, it being feared that an attempt to meet the low prices by a reduction in wages would precipitate a general strike with the customary results.

Several important consolidations of coking interests

in Pennsylvania were effected during 1903. Chief among these was the absorption by the H. C. Frick Coke Company of the United Coal & Coke Company, the McClure Coke Company, the American Coke Company, the Continental Coke Company and the Southwest Coke Company. All of these companies had been under the management of the Frick Company for nearly two years prior to the consolidation. The merged organizations own about 18,000 ovens and control about 75 per cent. of the Connellsville production. The Pennsylvania Coal & Coke Company absorbed the Webster Coal & Coke Company, the Pittsburgh Coal Company bought out the Colonial Coke Company and the Somerset Coal Company absorbed a number of formerly independent organizations in the Meyersdale region.

Among the new construction work begun or completed in Pennsylvania during the past year may be mentioned the following:

	Ovens.
Oak Ridge Coal & Coke Company, at Hastings	50
H. C. Frick Coke Company, at Mutual	*122
Pittsburgh Coal Company, at Smock	*100
Hecla Coke Company, at No. 3 plant	*200
Somerset Coal Company, at Elk Lick	*265
W. J. Rainey Coke Company, at Acme	*62
Victoria Coal & Coke Company, at Perryopolis	50
Gilmore Coke Company	50
Central Connellsville Coke Company, at New Salem	150
Orient Coke Company, in Lower Connellsville district	500
Corrigan-McKinney Company, at Strangford	300
Puritan Coke Company, in Lower Connellsville district	100
Briar Hill Coke Company, at New Salem	300
Masontown Coal & Coke Company, in Lower Connellsville district	80
Riverview Coal & Coke Company, at Riverview	60
Geneva Coke Company, in Lower Connellsville district	13
Union Coke Company, at Merrittstown	400
Bessemer Coke Company, in Lower Connellsville district	138
Ellsworth Coal Company, at Scenery Hill	250
Rich Hill Coke Company, at Outcrop Station	56
Clairton Steel Company, near Brownsville	1,000
National Coal & Coke Company, in Fayette County	400
O'Connell Coal & Coke Company, at Menallen	30
Rock Coal & Coke Company, at Lynn Station	50
Whyel Coke Company, at Dunn	40
La Belle Coke Company, on Fifth Pool, Monongahela River	*200
Jones & Laughlin Steel Company, at Hazlewood	*500
Penn Gas Coal Company, at Irwin	50
Latrobe Connellsville C. & C. Company, at Latrobe	125
Oliver & Snyder Steel Company, at Oliver	*328
Pennsylvania Coal & Coke Company, at Cresson	100

* Additions to existing plants.

The foregoing list, comprising over 5500 new ovens, does not include any by-product retort ovens, which are discussed elsewhere.

All of the above new construction work has been carried on in territory already developed as coke producing regions, with the exception of the plant of the Ellsworth Coal Company, at Scenery Hill. This plant is the first one to be constructed in Washington County, although it is one of the large coal producing counties of the State. If this pioneer operation proves a success rapid development of the coking industry in the county is looked for. The plant is of modern construction, equipped with crushers and washers, and operated by electricity.

There was comparatively little new railroad building done in Pennsylvania during 1903 which had for its object the development of new coking coal fields except a few branch lines. The Buffalo, Rochester & Pittsburgh Railroad Company completed a new branch from near Punxsutawney to Ernest, where new coal properties of the Jefferson & Clearfield Coal & Iron Company are being developed. The same railroad has under construction 17 miles of line from Ernest to coal lands near Elder's Ridge. Two branch lines are under construction from the P., C., C. & St. L. Railway at Burgettstown to coal lands owned by the Pittsburgh & Eastern Coal Company of Pittsburgh. The P. V. & C. Railway constructed the Monongahela River branch from Brownsville along the right bank of the Monongahela River to the Lower Connellsville coking fields.

J. P. K. Miller, chief engineer for the H. C. Frick Coke Company, estimates the production of coke in the Connellsville region for 1903 at 10,500,000 short tons and for the Lower Connellsville at 2,300,000 tons. The output in the two districts in 1902 was 10,418,366 tons and 1,899,111 tons, respectively.

West Virginia.—There was more activity in the development of new coal fields, in the construction of new coke ovens, and in the building of new railroads for the purpose of opening up undeveloped coal areas, than was shown in any other State of the Union. In the northern part of the State much development is looked for as the result of the sale of the W. Va., C. & P. Railway Company to the Wabash interests, this sale carrying with it the control of the properties operated by the Davis Coal & Coke Company. In the southern part of the State quite an interesting struggle has been on during the past year between the Chesapeake & Ohio and the Norfolk & Western railroads. Many thousands of acres of undeveloped lands rich in good coking coals lie between the almost parallel lines of these two roads crossing this section of West Virginia from east to west. Each road has been very active in 1903 in locating branch lines to reach these coal lands ahead of its rival. The region has been overrun with parties of engineers surveying routes, and a considerable amount of construction work has also been completed, and more is still under way. Considerable interest has also been aroused by the building of what is known as the Deepwater Railway from the station of Deepwater, near Kanawha Falls, on the line of the C. & O., to probably some point on the Norfolk & Western. The new road, it is said, will open up some of the most valuable coking coal lands in the State, but what its ultimate development will be is a matter of some conjecture to people not in the confidence of the projectors. It is not allied, so far as known, with either of the other lines.

Another important piece of railroad construction now in progress is that of the Coal & Coke Railroad (formerly known as the Charleston, Clendennin & Sutton), from Elkins to Charleston. This line is owned principally by Ex-Senator Henry G. Davis, who is also the chief owner of the Davis Colliery Company, who control extensive coal lands along the line of the railroad. The road runs in a northeast-southwest direction, making almost a direct line through the center of the State. Its length will be about 175 miles. At the northeast terminus it connects with the Baltimore & Ohio and the West Virginia Central, and at Charleston with the Kanawha & Michigan and the Chesapeake & Ohio. The Davis Colliery Company have three quite extensive operations near the eastern end, at Coalton, Harding and Junior. During the past summer 200 new ovens were built at Coalton and 50 at Harding. The railroad company own something over 100,000 acres of coal lands of the Pittsburg and Freeport Measures, near the center of the line, and in a reasonable time a large number of coke ovens will be built.

The principal coke producing region of West Virginia is the Pocahontas Flat Top district comprising the counties of McDowell and Mercer. Next to the Connellsville district of Pennsylvania it is the most important coke producing district in the United States. The principal development in this region in 1903 was the leasing by the United States Steel Corporation of a large tract of coal lands from the Pocahontas Coal & Coke Company. The property is situated on Tug River, in McDowell County. It is the intention of the Steel Corporation to construct altogether about 3000 ovens, of which 1100 have been completed. In addition to the Steel Company's development a number of new leases were taken up at the eastern end of the field, on what is known as Widemouth Creek, where, it is stated, about 1400 new ovens will be erected. None of these have been started.

In the Pocahontas district of West Virginia should also be included the operations at Pocahontas just across the line in the State of Virginia. One hundred and sixteen ovens were added to this plant in 1903, making a total of 800 ovens. Excluding the operations of the United States Steel Corporation on Tug River, but including the ovens at Pocahontas, in Virginia, the tot-

number of ovens in the district on November 1, 1903, was 8317. In the West Virginia portion alone there were 7517, as compared with 6940 at the close of 1902. The production for the entire district for 1903 is estimated at 1,400,000 short tons, a slight increase over the preceding year. The railway extension in this district in 1903 is the construction of a branch line of the Norfolk & Western up Widemouth Creek to the new leases in Mercer County, already referred to. The grading of this branch was nearly completed at the close of 1903. The same company completed, in 1903, a branch line 12½ miles in length from Welch, McDowell County, up Tug River, to reach the property of the United States Steel Corporation.

Two other coking districts in the southern part of the State are the New River and the Kanawha, both located on the line of the Chesapeake & Ohio Railway. The operations in these districts, particularly the former, were much interrupted during the earlier months of 1903 by labor troubles. By the time these were settled the turn in the tide of industrial activity had come and the production for the later months was smaller even than in the first half of the year. The following statement, furnished to the writer by Neil Robinson of Charleston, illustrates the tendency of production for the two districts during the year.

Production of Coke in the New River and Kanawha Districts of West Virginia in 1903, in Short Tons, by Months.

Month.	New River.	Kanawha.	Total.
January	30,120	17,580	47,700
February	22,420	12,840	35,260
March	30,240	15,400	45,640
April	33,900	15,100	49,000
May	28,020	12,240	40,260
June	27,380	7,260	34,640
July	22,240	6,300	28,540
August	19,720	5,220	24,940
September	18,240	3,000	21,240
October	21,480	4,880	26,360
November	17,820	3,600	21,420
December (estimated)	17,500	3,500	21,000
Totals	289,080	106,920	396,000

The production of the New River district in 1902 was 317,086 tons, and that of the Kanawha district 130,642 tons, making a total of 447,728 tons, compared with which the output in 1903 shows a decrease of 51,728 tons, or a little more than 11 per cent. Both of these districts were the scenes of prolonged strikes in 1902, which continued into 1903. In 1901 the two districts produced 564,109 tons of coke, or 168,109 tons more than last year.

G. H. Caperton, secretary of the New River Coal Operators' Association, states that there were only 50 new ovens completed in the New River district in 1903. These were built by the Low Moor Iron Company. There were, however, a number of new mining plants constructed and put in operation during the year. Among these may be mentioned:

On Laurel Creek branch of the C. & O. Railway: Glensdale Colliery Company, Hemlock Hollow Coal & Coke Company and Excelsior Lumber Company.

On the Piney Creek branch: Piney Colliery No. 2, Raleigh Coal & Coke Company mine No. 2, Lanark Fuel Company, Wright Coal & Coke Company mine No. 2, and Mabscott Coal & Coke Company.

On Loup Creek branch: McKell Coal & Coke Company, two mines; Oakwood Colliery Company, Paral Colliery Company.

On the main line: Beechwood Coal & Coke Company No. 2.

On the Southside branch: Lowmoor Iron Company No. 2.

In the Kanawha district the following new mining operations are reported by Mr. Robinson:

On the Cabin Creek branch of C. & O. Railway: Leewood Colliery Company, West Virginia Colliery Company, Lamont Mining Company and Belleclaire Coal Company.

On Armstrong Creek: Cardiff Coal Company.

In order to reach these new developments, the Chesapeake & Ohio Railway has been building and extending a number of branch lines, as follows: Up Piney Creek to beyond Raleigh mines; up Laurel Creek from Greenwood to Hemlock Hollow; up Bell Creek, from Twenty-Mile Creek; up right fork of Armstrong Creek, between Mt. Carbon and Powelton; up White Oak Creek, from Loup Creek; up Paint Creek to open properties above Ten-Mile Branch; up Cabin Creek, from Main Creek, to Fifteen-Mile Fork; Guyandotte river line; Big Sandy River extension, to open up the Elkhorn field of Kentucky. All of this is new work credited to 1903. The C. & O. is also driving a tunnel, 3000 feet in length, from the head of Cabin Creek to open up coal fields on the Marsh and Clear forks of Coal River.

The Deepwater Railway, already mentioned, is pushing its line from Deepwater, on Pool 2 of the Kanawha River, to the Bluestone, at the mouth of Widemouth Creek, a distance of 85 miles. Every mile of this line will run through coking coals, including the Clarion, or Eagle, the Powelton and Kittanning Measures of the Kanawha series and the New River and Pocahontas Measures of the Conglomerate series. At the present time 55 miles of the line are under contract (10 or 15 miles being already completed), and the contract for the remaining 30 miles will be let as soon as certain condemnation proceedings have been decided by the courts. Many operations are contemplated along this line, but ground for only one has so far been broken.

There are two other districts in the southern part of the State where a small amount of coke is produced—namely, the Tug River district on the Norfolk & Western and in the section of Kanawha County reached by the Kanawha & Michigan Railway. In the former there are only 50 ovens, and there were no new developments in 1903. Nor was there any new territory opened up in the Kanawha & Michigan region. There were, however, 225 new ovens added to existing plants during the year, making a total of 429 ovens in operation. The Columbus Iron & Steel Company have 100 ovens under construction in the same district.

Passing now to the northern part of the State, the developments by the Davis interests along the line of the Coal & Coke Railway have already been referred to. Outside of this some of the most important work in this section of the State has been done during the past year in the vicinity of Morgantown in Monongalia County. The Deckers Creek Coal & Coke Company, composed of United States Senator S. B. Elkins and associates, are building 500 ovens in this vicinity. The Clinton Coal & Coke Company are constructing 300 ovens, and the Valley Falls Coke Company are building 50 ovens. Other developments completed or in progress in other periods of this, the Upper Monongahela district, during 1903, were as follows:

	Ovens.
Austen Coal & Coke Company, Austen	220
Waddell Coal & Coke Company, Barbour County	300
Wabash Coal & Coke Company, Clarksburg	...
Overholt Coal & Coke Company, Cecil	200
Manufacturers' Coal & Coke Company, Hardmann	100

The first coke made in the vicinity of Clarksburg was shipped by the Hutchinson Fuel Company in February, 1903. The Fairmont Coal Company completed 50 new ovens in 1903, and had 100 more under construction at the close of the year.

In the Upper Potomac district the Union Coal & Coke Company are said to be constructing 1000 ovens, on the line of the Western Virginia Central Railway, and the Federal Coal & Coke Company are reported as having 500 ovens building in the Tygarts Valley. The Weaver Coal & Coke Company are reported as adding 200 more ovens to the 300 already completed, and the Wheeling Coal & Coke Company, in Marshall County, in the "panhandle," are said to be building 100 ovens at their new works. Whether all of these contemplated constructions will be completed in the face of existing conditions, or if completed what effect will be produced upon the coking industry of the State, is problematical. There is good reason to believe that history is going to repeat itself, and that the development work encouraged by the prosperous conditions is going to result in an overproduction or in a capacity in excess of the demand, such as existed in 1893, 1894 and 1895. The only statistics of production in the northern part of West Virginia which have been furnished the writer are for the Fairmont district, but they may be taken as indicative of conditions prevailing in 1903 and furnish some basis for a prophetic glimpse into the coming year.

The production for this district in 1903, estimating

for the months of November and December is shown in the following table:

Coke Production for the Fairmont District of West Virginia in 1903.

Month.	Average number ovens in blast.	Tonnage.
January	887	35,501
February	973	29,265
March	1,002	37,818
April	734	31,102
May	474	16,067
June	245	9,344
July	244	9,313
August	208	8,407
September	134	6,375
October	170	7,428
November (estimated)	170	7,280
December (estimated)	170	7,150
Total		205,050

In the Upper Potomac district, which embraces the counties of Randolph and Tucker, a number of new mines were opened up in 1903, but none of them went into the manufacture of coke. The output for this district during the year (including the ovens in the Tygarts Valley) was between 325,000 and 350,000 tons, as compared with 412,000 tons in 1902.

Virginia.—The principal coking developments in Virginia were made in Wise County, along the Clinch Valley branch of the Norfolk & Western Railroad. The Tazewell County operations belong properly to the Pocahontas Flat Top coking district, and have been mentioned in that connection under West Virginia. The new construction work reported as completed or begun in Wise County during 1903 included the following:

	Ovens.
Imboden Coke Company, on Pigeon Creek	200
Norton Coal Company, at Norton	100
Guests River Coal & Coke Company, at Norton	50
Bridge Coal & Coke Company, at Wise	150

Alabama.—Alabama, like the other important coke producing States, suffered from the slump in the iron and steel trade which marked the later months of 1903. The production for the State last year is estimated at 2,400,000 short tons, as compared with 2,552,246 tons in 1902.

The principal developments during 1903 consisted of 200 beehive ovens constructed by the Sloss-Sheffield Steel & Iron Company at Flat Top; an addition of 38 beehive ovens to the 200 built in 1902 by the Lacey-Buek Iron Company, at Trussville; 100 beehive ovens by the Jenifer Furnace Company at Aubrey, all of these being located in Jefferson County. The Lookout Mountain Iron Company have completed a plant of 75 beehive ovens at Battelle, near Fort Payne, in De Kalb County, and will build 75 more during 1904. The Central Coal & Iron Company have under construction a battery of Semet-Solvay by-product ovens at Tuscaloosa. Other new work reported as begun in 1903 or contemplated for 1904 is reported as follows:

	Ovens.
Tutwiler Coal, Coke & Iron Company, at Birmingham	50
Sligo Coal & Coke Company, at Sligo	50
Empire Coal & Coke Company, at Empire	250
Pennsylvania Coal & Coke Company, at Ensley	200
Boyd Coal Company, at Sligo	15
Central Coal & Iron Company, at Holt	164
Alabama Consolidated Coal & Iron Company, at Lewisburg	300
Woodward Iron Company, at Woodward	300

All the railroad extension in Alabama in 1903 was done by the Louisville & Nashville Company—a new branch of 25 miles from a point about 10 miles north of Birmingham to the Little Warrior River, 2 miles below Littleton. It will open up a new portion of the Pratt seam, the Nickel Plate and the Newcastle, or "Big" seam. The same company are also extending the north division of the Birmingham Mineral Railroad from Altoona to Atalla. This extension will open up several mines on Blount Mountain.

Colorado.—Comparatively little new work was done in Colorado during 1903, and the production for the year was considerably less than in 1902. John T. Kibler, general manager of the fuel department of the Colorado Fuel & Iron Company, estimates the output of coke in 1903 at about 800,000 tons, which is a decrease of nearly 20 per cent. from that of 1902. The production in 1903 was lower than it would have been on account of the strike among the mine workers, which shut down nearly all the mines in the coking regions during most of the last two months of the year. Although the new work in 1903 amounted to practically nothing, the production, except for unfavorable conditions, would have been considerably augmented by the new plants constructed during the two preceding years by the Colorado Fuel & Iron Company, as follows: At Redstone, 250 ovens; at Tabasco, 302 ovens; at Segundo, 800 ovens, and at Tercio, 600 ovens, all of which were completed about the first of 1903.

Other States.—Although there were 26 States in which coke was produced in 1903, the five included in the preceding discussion are credited with over 93 per cent. of the total output. There are only four other States, Tennessee, Kentucky, Ohio and Massachusetts, in which the production amounts to as much as 100,000 tons. All of that of Massachusetts is produced at the Otto-Hoffman plant at Everett, and a large part of Ohio's output is from the recently constructed by-product plant at Hamilton. There was no new development in either Ohio or Massachusetts in 1903.

In Tennessee, which is the sixth State in producing rank, the new work in 1903 may be summarized as follows: The Bon Air Coal & Iron Company are building 200 ovens at Bon Air; the Sequatchie Valley Coal & Land Company are reported as building a plant of the same number of ovens in the Sequatchie Valley; the Sewanee Coal, Coke & Land Company are building 50 ovens at Clouse Hill, and the Roane Iron Company have increased their plant at Rockwood from 210 to 370 ovens.

The new work reported in Kentucky consists of ten new ovens added to the plant of the Ohio Valley Coal & Mining Company at De Koven, doubling its size; plans for 200 ovens at Gladstone by the Gladstone Coal & Coke Company, and four ovens built by the Northern Coal & Coke Company in Pike County.

In the Rocky Mountain States the principal development outside of Colorado was the letting of a contract for the building of 100 ovens by the Washoe Copper Company at Storrs, Mont., and the addition of 127 new ovens to the plant of the Montana Coal & Coke Company at Horr.

The By-Product Coking Industry.—The most interesting and important development in the by-product coke oven industry during the past year was the consummation of negotiations between the Semet-Solvay Company and the United Coke & Gas Company, by which the former have acquired, under lease, the control of the Otto-Hoffman coke oven business in the United States, and the formal announcement of which was made in *The Iron Age* on December 3. It is scarcely to be doubted that this arrangement will redound to the more satisfactory development of the business upon conservative and economical lines, eliminating competition and furnishing better opportunity for the promotion of the industry in hitherto somewhat neglected lines, notably the profitable utilization of the by-products.

The close of the year 1903 shows that there were 2144 by-product ovens in operation, of which 481 were put in blast during the year. The new establishments included 212 Otto-Hoffman ovens at Sharon, Pa., built for the Sharon Coke Company and 100 of the same type at Camden, N. J., for the South Jersey Gas, Electric & Traction Company.

In addition to the completed ovens there were 1180 new ovens under construction, the most of which will be in operation during 1904. Of the plants under construction, the most important is that of 564 Otto-Hoffman ovens at Buffalo, N. Y., to be operated in connection with the Lackawanna Steel Company. Three hundred and seventy-six of their ovens are nearing completion, and will be put in blast early in the present year. The other 616 ovens building are distributed as follows: Johnstown, Pa., 100 Otto-Hoffman ovens, additional to the 160 ovens operated by the Cambria Steel Company; Duluth, Minn., 50 Otto-Hoffman ovens built for the Zenith Furnace Com-

pany; Chester, Pa., 40 Semet-Solvay ovens; Cleveland, Ohio, 66 Wilcox ovens; Chicago, Ill., 120, Geneva, N. Y., 30, Lebanon, Pa., 90, Milwaukee, Wis., 80, and Tuscaloosa, Ala., 40, Semet-Solvay ovens.

Of the 2144 ovens in operation during 1903, 1489 were of the Otto-Hoffman type, and 655 were Semet-Solvay ovens. Blast furnace coke is produced at 924 of the Otto-Hoffman ovens, the gas being used for fuel purposes, 400 ovens produce domestic and locomotive coke and illuminating gas, 150 produce foundry and domestic coke and illuminating gas, and 15 ovens produce coke and gas that are used for burning lime. Most of the Semet-Solvay ovens produce blast furnace coke, all but 160 being operated in connection with iron and steel works. The gas is used for fuel purposes, except at the Detroit works, where it is disposed of by piping through the city.

It is interesting to note in connection with the development of the by-product coking industry that the plants at Detroit, Dunbar, Ensley, Johnstown, Syracuse and Wheeling have all been in operation a sufficient length of time to pass upon the merits of recovery ovens, both as to the quality of the coke and the cost of making it. All of these plants have been more than doubled. The 100 additional ovens now in course of construction at Johnstown is the third plant built at that place. The first plant constructed there was one of 80 ovens in 1895. Eighty more were added in 1898 and the present construction will be completed this year.

It should also be stated that all of the ovens built in the last two years or that are now under construction (and these represent nearly three-fourths of the total ovens built and building) are larger and quicker in action than the earlier ones. Formerly about 3.75 tons of coke per oven per day was a fair average, now it is about 5 tons per day, representing a yearly capacity per oven of, approximately, 1800 tons. This would mean a possible annual yield from the 3324 ovens now built or building of nearly 6,000,000 tons, or, allowing for mishaps or other contingencies, a probable output of between 5,000,000 and 5,500,000 tons, or about 25 per cent. of the entire production of the United States in 1903.

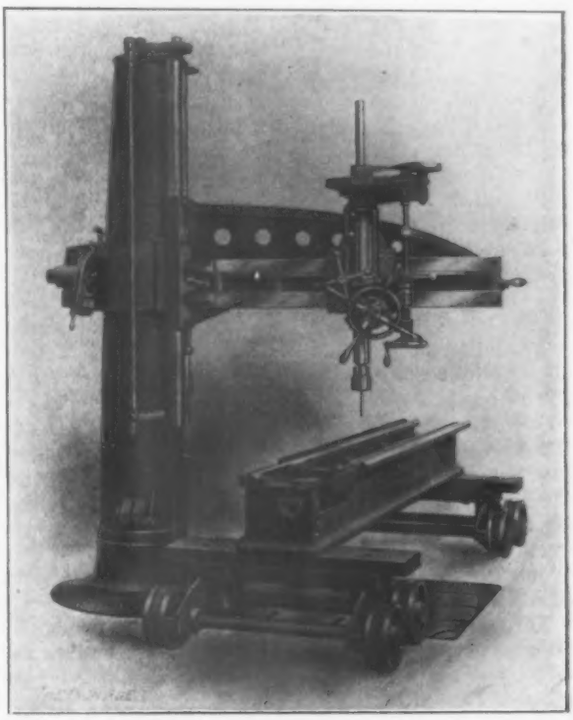
During the past year an experimental plant of a new design of retort coke ovens has been constructed by the Jones & Laughlin Steel Company, at Pittsburgh, Pa. These ovens are the invention of Prof. T. S. C. Lowe of Los Angeles, Cal. The plant consists of a set of eight ovens. It was put in blast in April, and was shut down in October, 1903. In these ovens no attempt is made to save any of the by-products, except the gas. Philip H. Hasbrouck, engineer in charge of the works, in a letter to the inventor, under date of September 16, states that the entire coke product of this plant had been used in the blast furnaces of the Jones & Laughlin Company with satisfactory results. The amount of coke and surplus gas produced was not stated. In addition to this plant at Pittsburgh, a small plant of four ovens has been constructed at San Francisco, Cal., and another of six ovens is located at Rockaway, L. I. The latter plant was in operation for two months (August and September), 1903. None of these are included in the previous discussion of by-product ovens, as all the plants are of an experimental nature.

The development of the by-product ovens calls attention to another change in the coking industry. It means a gradual shifting of the scenes of operations from the coal fields to localities where the products of coke and gas are consumed. Beehive ovens are with few exceptions located at or in the immediate vicinity of the mines from which the coal is drawn. Retort ovens, on the other hand, are located in the vicinity of blast furnaces and steel works if coke is to be the primary product and in the vicinity of large cities if gas is the major consideration. The principal factor to be considered at present is the securing of a profitable market for the by-products of tar and ammonia, particularly the former. For this we look hopefully, if not confidently, to the development in this country of a chemical industry which will supply our domestic markets with chemical products now brought from Germany to the value of many millions of dollars each year.

Drilling and Tapping Work on Trucks.

On large pieces entering into the construction of various machine tools and other similar structures there are often required several minor operations, such as drilling, tapping, &c., wherein no refinement of accuracy is necessary. These operations when performed in the usual way—that is, by taking the piece to the proper tool and placing it upon the table—may frequently consume time and labor so out of all proportion to their importance as to unreasonably affect the costs of production. One method of reducing expense and delay in this respect, as practiced at the works of the Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, is illustrated at this time.

Certain of the drilling and tapping in the beds of lathes made by this company is such that a slight variation from absolute truth is entirely permissible; in fact, time spent in securing close approach to extreme accuracy is senseless waste. The labor required for transferring a heavy lathe bed to, onto, off and from the



LATHE BED ON TRUCKS AT RADIAL DRILLER.

table of a drilling machine, and the time consumed in blocking up an overhanging end and in securing proper level, are such as to represent a considerable item in the cost of each piece of this nature. Equal, if not superior, accuracy is obtained by use of the trucking method illustrated, a reasonably firm and level floor affording a perfectly satisfactory setting. In the case shown the supports are simply two traveling crane trucks, the flanges of whose wheels have been turned off for equality and truth of their diameters, as well as to give greater width of the tread. Reasonable accuracy of their construction and practical equality of their hight may readily be secured, and will enable them to provide reliable setting for the work in question.

The saving to be effected by use of such trucks in doing away with all necessity for extra handling of heavy castings is evident, the drilling operations requiring merely a stoppage of the piece on its way from the planer, for instance, to another subsequent important operation or to the erecting floor.

The office of Charles S. Belsterling, traffic manager of the American Bridge Company, has been removed from Philadelphia to the Frick Building, Pittsburgh.

The Pittsburgh Iron Trade in 1903.

BY ROBERT A. WALKER, PITTSBURGH, PA.

General Features.

The year 1903 in the iron trade made a unique record, and one that will probably stand for some time to come. It was a year of violent fluctuations in prices, a feast and then a famine in demand, labor troubles and strikes during the last half of the year, and closed with a good many uncertain conditions which leave the outlook for the new year somewhat in doubt. To the careful observer of events as they have transpired in the iron trade for the past ten years it was evident that the wonderful pace which prevailed during the four years from 1899 to 1902 could not be kept up indefinitely, and there were predictions freeely made in the latter part of 1902 that the year 1903 would show a falling off in tonnage and a decline in prices. That this prediction was fully justified was proved by the events of the year just closed. The condition of the iron trade at the close of 1903, when compared with conditions in the early part of the year, is strong proof of the truth of an expression attributed to Andrew Carnegie: "Steel is either king or pauper." Steel was king in the first six months of the year and pauper in the last six months. A falling off in demand for iron and steel products, while generally expected this year, was no doubt intensified by the events in Wall Street, which shook public confidence and were the cause of the postponement of a large amount of new work which would have meant the consumption of many thousands of tons of iron and steel of various kinds.

When the era of depression set in, along in June or July, the decline in prices in certain branches was rapid, in spite of the efforts of the large interests to hold the market. They were only fairly successful. When the United States Steel Corporation were organized the statement was made that it was not the intention of the corporation to advance prices beyond a conservative point, but on the contrary their efforts would be directed in the direction of securing stability in the market. This policy was plainly manifest in the early part of the year, when demand was beyond the capacity of the mills to supply, the corporation steadily refusing to advance prices. It was also shown in the last half of the year, when the market was held very much better than it would have been under conditions which existed before the organization of the Steel Corporation. It would be folly to expect any interest, no matter how large, to thoroughly control prices, much less demand; but it has been fully demonstrated that the Steel Corporation, with their huge interests, are an important factor in steadying a market when there is a very limited demand and the tendency of prices is decidedly downward. It is safe to assume that the year 1903 would have closed with very much lower prices all around had it not been for the efforts of the large interests to sustain the market and for the shut down movement in pig iron, which was inaugurated in the Central West early in October with such beneficial results.

In the matter of profit the year 1903 will not bear favorable comparison with preceding years. High prices prevailed during the first half of the year, but in the second six months violent fluctuations took place, and on some lines business was done at an actual loss. Taken as a whole, the year can be put down as fairly satisfactory, considering the unfavorable conditions in the stock and money markets and the numerous strikes in collateral industries, which did a great deal of harm.

As to the outlook for 1904, it is somewhat dubious. The year closed with only a fair demand, and with the market as a whole showing a weak tone. Consumers do not have much faith that prices will be higher and for months have pursued the policy of buying in small lots for actual needs. The outlook is that in the first two or three months of 1904 this policy will be continued, and it seems there will not be enough tonnage to give the mills full employment. However, general business conditions throughout the country were in splendid shape at the close of 1903, crops in the West had been unusually large and the farmers had plenty of money. This ought to have a good general effect on the steel trade when the business campaign of 1904 fairly opens up.

The Steel Trade and Wall Street.

When the great iron and steel interests were organized, and headquarters removed from Pittsburgh to New York, conservative men pointed out that this was a mistake, and that the steel business was rapidly getting into the hands of bankers and stock brokers, who did not know how to handle it properly, and that a day of reckoning would surely come. It has been openly charged that the heads of many of the large interests have been paying more attention in the past two or three years to the fluctuations of the stock ticker than to their own duties, and there is good ground for believing that the charge was not without foundation. The organization of the large steel interests and the placing on the market of their securities was a tempting morsel in the way of promises of dividends, and the public was eager to buy, firmly believing that the wonderful prosperity in the iron trade in 1899-1902 would continue indefinitely. That their confidence was sadly misplaced was shown during the latter part of the year when iron and steel securities, and, in fact, all kinds of stocks, had the worst slump in the history of the country, and some of the large concerns were compelled to pass their dividends. It is evident that the organizers of the large interests figured on a false basis, as with the first signs of a depression in the steel business their stocks commenced to decline and reached figures that, if predicted a year or two ago, would have been scorned. Even the United States Steel Corporation, whose securities were always regarded with high favor, felt the force of the depression and in October cut the dividend on the common stock in half. It is freely predicted that at the January quarterly meeting the dividend on the common will be passed entirely. It has always been contended in conservative circles that the United States Steel Corporation made a serious mistake when they commenced pay dividends on the common stock, and there is no doubt, in the light of recent events, that this is true. The securities of the great corporation would have commanded higher figures to-day had a dividend on the common never been paid, as the $50,000,000 given to the holders of common stock would have been added to the surplus and would have made the corporation stronger. The unfortunate developments in connection with the affairs of the Crucible Steel Company of America, who in December passed their dividend, have had a very disquieting effect on steel securities, and it is the general opinion that this company will not resume dividends for a long time to come. In regard to Republic Iron & Steel Company it may be stated that while this enterprise has been conservatively handled and they have spent nearly all of their earnings, aside from disbursements of dividends on the preferred stock, in bettering the physical condition of their plants, they paid out dividends for a longer period than they should have done, and the course of the management in deciding to pass the dividend for the purpose of increasing the surplus has been very generally commended. The great slump in the stock market was precipitated by the adverse decision of the courts in the case of the Northern Securities Company, and was intensified by the depression in the iron and steel trades, which started about the time the decision was made. It is to be regretted that the stock market and the steel trade have become so closely allied, as fluctuations in the stock market have adversely affected the steel trade, and will continue to do so as long as the present close relationship

exists between the two. An important move by the large steel interests is the decision to bring back to Pittsburgh their operating departments, which really never should have been taken away from this city. Pittsburgh has always been regarded as the headquarters of the iron and steel trades, and it was but natural and to be expected that the operations of the large steel interests would be directed from here. During the year there has been a gradual concentration of interests in Pittsburgh, and early in 1904 the headquarters of the American Sheet & Tin Plate Company and the American Bridge Company will be established in this city.

New Construction.

The great activity in the building of blast furnaces and iron and steel plants of various kinds which prevailed during 1902 was lacking in 1903, especially in the last six or eight months of the year, when there was almost a complete suspension of new work, due to the depression in the steel trade which started about the middle of the year. As showing the great falling off in new construction, we may state that prominent engineering firms in this city, who for several years had kept a large force of draftsmen ranging anywhere from 50 to 100 men, were compelled to reduce these forces in some cases down to four or five men. The rapid decline in prices of iron and steel products, the unfavorable money market and the strikes prohibited the building of new plants, and, as stated above, new construction practically stopped. The announcement by the United States Steel Corporation during 1903 that it would spend upward of $30,000,000 in improvements, and new works was the most important event of the year in the matter of new construction. A part of this sum is to be spent in the building of a new blast furnace at McKeesport, the addition of a third converter at the Bessemer plant and the building of new pipe mills. It is at Lorain, Ohio, that the most important work is to be done, consisting of the building of at least two blast furnaces and of extensive pipe and tube mills. A great deal of preliminary work has already been done at McKeesport and Lorain, but it is understood that, owing to the unfavorable conditions, the original plans of the Steel Corporation have been revised to a very great extent, and it is not likely that the sum to be spent for improvements and new works will even approximate $30,000,000. During the year the Clairton Steel Company completed the building of two new blast furnaces at Clairton and also four open hearth furnaces, making a total of 12 at the Clairton Works. A third stack has been practically completed for several months, but was held back by reason of the boilermakers' strike and from other labor causes. Had the condition of the pig iron trade been good, there is no doubt but that this third furnace would have been completed and put in operation. The Clairton Steel Company did not need the metal from the stack, and simply put off finishing it, but will likely do so early in 1904. A new billet mill has also been added to the Bessemer plant of the Clairton Steel Company, and has already turned out some work. It was built by the Mesta Machine Company, and is a very complete mill.

At the Donora Works of the United States Steel Corporation, the work of building two blast furnaces and an open hearth steel plant has progressed steadily during the year, but neither the furnaces nor the steel plant have been completed. It is likely, however, that the two furnaces and the steel plant will be finished and put in operation early in 1904. It is said that plans are under way for still further additions to the pig iron and steel capacity of the Donora Works.

The Carnegie Steel Company, as usual with this company, spent a great deal of money in 1903, in bettering the physical condition of their works and also in the building of new plants. Early this year there was completed and put in operation a new blast furnace at Bessemer, giving a total of 11 stacks at the Edgar Thomson Works. The fifth stack at the Carrie plant, at Rankin, was also completed during the year, and has made some excellent records for production. At Youngstown, Ohio, the Carnegie Steel Company have a fourth blast furnace under way, but owing to delay in delivery of engines, this stack will not likely be finished before April next. In the Youngstown and New Castle districts the Carnegie Steel Company have spent a great deal of money, the principal new work being the rebuilding of Rosena Furnace at New Castle. At the Sharon, South Sharon and New Castle steel works, all of which were idle at the close of 1903, extensive improvements and repairs are being made, and the capacity of these three important steel works will be increased.

Very little new work was done in the Wheeling district during 1903. The La Belle Iron Works, at Steubenville, completed the building of their open hearth steel plant containing 12 furnaces, and have under way the erection of a second modern blast furnace, which will give the company an output of at least 800 tons of pig iron per day. The tin plate plant of Follansbee Brothers Company of Steubenville, which has been under erection for more than a year, has not yet been completed. It is understood, however, that this plant will be finished and put in operation early in 1904.

In the Pittsburgh district the number of new plants built in 1903 was very small, indeed. At Ambridge, about 15 miles from Pittsburgh, on the line of the Pittsburgh, Fort Wayne & Chicago Railroad, the American Bridge Company have under way the building of an immense bridge works, which will be much larger than any other plant in the country. Part of the plant was completed some time ago and eye bars have been manufactured in the works for several months. The balance of the plant is to be pushed as fast as possible, and it is expected to be fully completed by March or April.

In Pittsburgh the Jones & Laughlin Steel Company made large expenditures for improvements and have had under way for some months the installation of a new blooming mill, which, when completed, will allow this firm to turn out sheet and tin bars and also rails, if necessary, in large quantities. The Jones & Laughlin Steel Company have been rolling sheet bars on one of their merchant mills for some months. At Canonsburg, Pa., the Standard Tin Plate Company have about completed the building of a new plant containing four hot and four cold mills and two of the hot mills have been in operation for some time. The Canonsburg Steel & Iron Works have also completed the building of a new plant at Canonsburg, for the manufacture of tin plate and sheets.

Owing to unfavorable conditions in the steel trade and the tightness of the money market, a great deal of new work has been postponed and some of it may never come up again. Among these enterprises may be mentioned the building of a large open hearth steel plant at Youngstown, which has been indefinitely postponed. Plans had also been made for the building of other new plants and extensions to existing works, but much of this has been held off and some of it cancelled. The outlook for new construction work in 1904 is not very encouraging. It is recognized that existing capacity in all kinds of iron and steel products is ample enough to meet a normal demand, and, in fact, capacity is so large that only in times of an extraordinary demand will it all be employed.

Price Agreements.

In spite of all that has been said against the policy of maintaining price agreements, the fact has been pretty thoroughly demonstrated that when conservatively handled, price agreements are a positive benefit to the trade. In 1903 there were in existence price agreements of four of the principal fixed lines of iron and steel, these being plates, structural material, steel bars and shafting. In addition the rail pool was maintained all through the year and the billet pool was revived in July. During the entire year the price of beams was maintained steadily on the basis of 1.60 cents up to 15-inch, and plates were the same price. It is a fact, however, that in the early months of the year, owing to the enormous demand for these products, some of the mills that were in the agreement and others that were not, particularly in plates, were able to get anywhere from $2 to $6 a ton above official prices for prompt deliveries. The large interests, however, steadily refused to book tonnage above official prices, but at the same time were compelled to turn

away a large amount of business on which they could not make deliveries. Along in April and May the demand for plates and structural steel slackened down and premiums for prompt delivery disappeared. The price of steel bars was maintained steadily at 1.60 cents, Pittsburgh, until November, when, owing to lower prices on pig iron and steel and a very light demand, it was deemed advisable by the Steel Bar Association to reduce prices, and, accordingly, a cut of $6 was made, the price being reduced from 1.60 to 1.30 cents. At the same time and for practically the same reasons the Shafting Association made a reduction in price of shafting of about 10 per cent.

There is no doubt whatever but that the price agreements on the above products had the effect of steadying the market, and have been generally beneficial. These price agreements have been renewed for 1904, and will continue in force all through the year, unless some unexpected conditions come up which would make it advisable to terminate them, but this is hardly likely.

The Steel Rail Association has maintained the price of standard sections all through the year at $28, at mill, and in spite of general expectations of a reduction, we understand that the mills have again renewed the price of $28 for 1904 delivery.

Owing to the depression in the steel trade, which started in the summer months, the price of steel billets steadily declined and the trade became somewhat demoralized, some large sales having been made to leading consumers at very low figures. Owing to these conditions the billet manufacturers deemed it advisable to revive the billet pool for the purpose of steadying the market, and this was done in July. The price of Bessemer billets was fixed at $27 and open hearth at $28. It was very soon demonstrated, however, that the trade would not take hold at these prices, and at a meeting of the billet pool in November, a cut of $4 was made in Bessemer and $5 in open hearth, the price of Bessemer and open hearth billets being put at $23, Pittsburgh. On December 18 a meeting of the Billet Pool was held in New York, and this price was renewed for all of 1904. However, the full strength of the agreement on billets has not been tested, and it may be three or four months before the situation will be thoroughly clear. The amount of steel that is sold by the pool at the official prices is very small, as the leading consumers are covered by sliding scale contracts. For this reason, and also because of the steel business being centralized in the hands of half a dozen leading concerns, it is much easier to hold an agreement than in former years. The future course of the steel market and the operations of the pool will be watched very closely by the trade.

Foreign Trade.

All during the year 1902 and in the first half of 1903 the foreign trade of this country was practically neglected, the mills being so filled up with domestic orders that it was simply impossible to entertain foreign inquiries for material. An exception to this was in wire, wire nails and pipe, the American Steel & Wire Company having made regular monthly shipments of wire products abroad, and the National Tube Company have done the same in tubes. However, along in June and July, when demand fell off so rapidly, it was very soon seen that if our mills were to be kept in operation to anything like their full capacity, it would be necessary to again actively seek foreign trade. The United States Steel Corporation have been most diligent in this direction, and some months ago organized the United States Steel Export Company, a subsidiary interest. The business of the new interest is to look after foreign trade exclusively, and already a fair amount of tonnage in rails, plates, sheets and tin bars has been secured. The Southern iron producers have also gone after foreign trade, and have taken some tonnage for export shipment. The Pittsburgh Steel Company, whose principal product is electrically welded fencing, have enjoyed a large export trade, and some time ago established a plant in Hamilton, Ontario, to which wire is shippel, after which it is made into fencing and distributed all over the Canadian Dominion. The indications are that foreign trade will be pushed very vigorously during 1904, and our business in iron and steel exports during the year is expected to be very large.

Labor Troubles.

In sharp contrast to 1902, labor troubles prevailed in collateral industries during nearly all of the year of 1903, and worked a great deal of harm. The enormous demand for iron and steel products, and, in fact, for all kinds of material, brought about very high wages and a great scarcity of labor. The labor organizations seemed to have lost their heads in the prosperous times and made demands, both as regards wages and hours of labor, that were out of all reason and resulted in strikes in all the principal cities of the country, which at times put building operations almost at a standstill. Much trouble occurred during the year among the structural iron workers, a great deal of new work having been held up and much of it has been postponed indefinitely. In Pittsburgh alone it is said that more than $5,000,000 of new construction has been held up until next year, and some of this will probably never materialize. H. C. Frick had plans drawn for the building of a large hotel on the Cathedral site on Fifth avenue, in this city, which would have required 6000 to 8000 tons of steel, but this was called off, owing to the threatening attitude of labor and the high price of material. A long strike of molders occurred and they were finally defeated. Much trouble was experienced with the machinists, but after a number of conferences a satisfactory settlement was reached. The plumbers in the Pittsburgh district have been on strike since October 1, and the trouble is not yet settled. Innumerable strikes occurred in other branches of the building trades, and the amount of harm done by these strikes cannot be computed.

With the depression in the steel and other trades and the steadily falling markets, it became evident that labor would have to bear its share of the burden, and along in October reductions in wages were made, and on September 30 the Carnegie Steel Company posted notices at their various works of their intention to cancel existing wage scales. On January 1 heavy reductions in wages of skilled labor were made at the Carnegie plants, by the Jones & Laughlin Steel Company, and in fact in all kinds of manufacturing plants. Blast furnace labor has been reduced on an average of 15 per cent., and early in November the American Sheet Steel Company reduced wages 20 per cent. in their nonunion plants. This was followed by the Amalgamated Association conceding a 10 per cent. reduction in wages of sheet mill workers in such plants as sign the scale. The revision in wages on a general basis has really only commenced and is bound to extend through all lines. Very little trouble has been experienced in convincing labor that wages of all kinds must come down, and as a result there have been no serious strikes and none are anticipated.

Outlook for 1904.

The conditions surrounding the iron trade at the close of 1903 were very different from those prevailing at the end of 1902, and for this reason little can be said with certainty as to what 1904 promises in the way of prosperous business. We enter the new year with only a moderate amount of new business being placed, and a general feeling on the part of the trade that prices will not be any higher for the next several months at least. For this reason the hand to mouth buying policy that prevailed so largely during the last half of 1903 is certain to continue during the first quarter at least of the new year. There is no incentive to contract ahead, because higher prices are impossible until the demand is very much larger. The mills have only a small amount of work ahead, and many plants are idle for lack of orders. It is the general belief, however, that tonnage will improve very early in the new year, as stocks in the hands of jobbers and consumers are lower than for some years. This is shown by the character of the orders being booked, which are nearly all for prompt delivery. Many uncertain conditions have been cleared up and prices are low, with not much chance of declining further, except on a few lines. While the outlook for the

new year is not as encouraging as wished for, yet it has promise and it is thought that before we are very far into 1904 the mills will have more work than they have now and general trade conditions will be very much better. In spite of the severe depression that existed in the iron trade during the last three or four months of 1903 there were very few failures and these unimportant ones.

Pig Iron.—The record made in the pig iron trade in 1903 will not bear favorable comparison with 1902, either as regards demand or prices. In the early months of the year the demand for pig iron was beyond the capacity of the furnaces to meet, partly due, however, to the great scarcity of coke, which caused many of the blast furnaces in the Central West to run spasmodically and keep output down. The total output of pig iron in the United States in 1902 was much the largest in the history of the country for any one year and amounted to 17,821,307 gross tons. In the first six months of 1903 this record was broken, the output of pig iron of all kinds in this country for the first half of the year being 9,307,367 gross tons. However, commencing with July, output of pig iron steadily fell off, owing to the slackened demand, and in October the shut down movement was put in force, and the last three months of the year showed a very heavy falling off in pig iron production. In the Pittsburgh district there are now a total of 41 blast furnaces, two of these, however, not being quite completed, one stack belonging to Clairton Steel Company and the other to Jones & Laughlin Steel Company. Two stacks are in course of erection by the American Steel & Wire Company at Donora. New stacks built during 1903 included two at Bessemer, one Carrie, one Eliza, and three at Clairton. The Pittsburgh district now has a capacity for turning out very close to 90,000 tons of pig iron a week when all the stacks are active, or nearly one-third of the entire output of the country. This shows conclusively the facilities of Pittsburgh for cheap pig iron production. At the close of the year nearly half the furnaces in the Pittsburgh district were idle, but some of these will resume during January.

Bessemer Pig.—On January 1, 1903, Bessemer iron was scarce and high in price, selling at $21, Valley, or $21.85, Pittsburgh. At this time coke was scarce and there was a heavy demand for iron. Furnaces were paying as high as $5 a ton for coke and blast furnaces in the Pittsburgh and Valley districts were closing down for want of it. The price of Bessemer iron continued to rule at about $21 until April, when, owing to increased coke supply and larger output of iron, prices commenced to decline, and by July 1 Bessemer iron was selling at about $18, Valley. From this time forward the price declined steadily, and at the close of the year Bessemer pig was offered at very close to $13, Valley furnace, the market being weak. During the year the United States Steel Corporation came into the market three or four times and bought heavily of Bessemer iron, but in the latter part of the year made all the iron the constituent companies needed and more. It is not probable that the Steel Corporation will very soon again be purchasers of pig iron in the open market, as with their increased furnace capacity they will be able to make all the iron they need.

Gray Forge.—The market in 1903 on gray forge iron was very similar to that of Bessemer, the price being high in the early part of the year and low at the close of the year. On January 1 forge iron was selling at about $20.50, Pittsburgh, and the price held until along in May, when a decline set in and prices went down rapidly. A good deal of Southern forge came into the Pittsburgh market in the early part of the year on account of the scarcity of domestic, and in the latter part of the year on account of it being offered at lower prices than domestic funaces would accept. In December Northern gray forge sold at $12.75, Pittsburgh, or slightly lower. In the latter part of that month the market improved to some extent and sales of forge were made as high as $13.25, Pittsburgh.

Foundry Iron.—In January, 1903, Northern No. 2 foundry iron was very hard to get owing to scarcity of coke, and it sold for prompt shipment as high as $24 and $25, Pittsburgh. At this time a good deal of Southern and also some foreign foundry iron was coming into the Pittsburgh district, the high prices ruling allowing foreign iron to be delivered here at a good profit to the sellers. These high prices continued until April, when the market softened, owing to better supply of coke, and in the balance of the year prices declined steadily, No. 2 foundry selling in December as low as $13.75, Pittsburgh. In the latter part of the year the Southern Furnace Association was disrupted and very low prices were made on Southern foundry iron, with the result that quite a large tonnage was sold for delivery in the Pittsburgh district.

Steel Billets.—The record made by the billet trade in 1903 was not as good by any means as that in 1902, prices during the latter part of the year showing a decline of about $8 a ton. Very little new capacity was added during 1903, either in Bessemer or open hearth works, and it is not probable that there will be much done in the direction of building new plants for some time. At Youngstown the Republic Iron & Steel Company considerably enlarged their Bessemer plant, while the La Belle Iron Works, at Steubenville, Ohio, completed their open hearth plant, containing 12 furnaces. In Pittsburgh the Clairton Steel Company finished their plant, which also contains 12 50-ton furnaces, while at Duquesne several new open hearth furnaces were added. In January the steel market was very active and prices high. Bessemer billets were selling at $29.50 to $30, and open hearth about $1 a ton higher. These prices not only continued, but higher prices were paid for billets in March, Bessemer selling at $31 and open hearth at $32. These high prices ruled until about June, when, owing to an increased supply and falling off in the demand, steel commenced to weaken, and during the next four or five months the course of the market was steadily downward. Early in July the steel market became somewhat demoralized, and a meeting of the billet makers was held in New York at which the old billet pool was revived, the price of 4-inch Bessemer billets being put at $27, and open hearth $28, at mill, all the leading steel interests, including United States Steel Corporation, Jones & Laughlin Steel Company, Wheeling Steel & Iron Company, Cambria Steel Company, Lackawanna Steel Company and Pennsylvania and Maryland Steel Companies, being parties to the agreement. It was hoped that by reviving the billet pool it would steady the market and buyers would take hold. This, however, was not the case, as the outside open hearth plants that had not joined the pool commenced to undersell and took practically all the tonnage being offered. There was more or less cutting of the pool price, and early in November another meeting of the Steel Billet Association was held in New York, at which the price of Bessemer billets was reduced $4 and open hearth $5 a ton, the new price of Bessemer and open hearth steel being fixed at $23, Pittsburgh, with $1 a ton advance for long sheet bars and $1.50 a ton for sheet bars cut to lengths. At this meeting a number of the outside open hearth plants joined the agreement, which considerably strengthened the situation. Sales of steel at the pool prices, however, have been very small, as the leading consumers are covered by sliding scale contracts by which they secure steel at prices considerably under those fixed by the pool. In December another meeting of the Billet Association was held in New York, at which the agreement was renewed for 1904. It will take some little time, however, to determine the strength of the agreement, but it is said that the steel market is in better shape than at any time since the pool was revived. The amount of steel being sold at the close of the year was relatively small, owing to so many finishing mills being idle.

Steel Rails.—There was no change in price of steel rails during 1903, $28 a ton for standard sections ruling all through the year. The rail mills had steady work through nearly all of 1903, owing to the heavy orders booked the year before. However, the outlook for this important branch of the steel business for 1904 is not as bright as could be desired. The mills entered the new year with less than 1,000,000 tons of orders on their books, and the leading mills are actively seeking foreign trade. The outlook is that rail tonnage in 1904 will fall considerably short of the year just closed.

Structural Material.—The structural trade in 1903 was only fairly satisfactory, the last three or four months of the year being comparatively quiet, largely owing to labor disturbances and the tightness in the money market, which had the effect of postponing a large amount of new work, some of which was all ready to close. There was no change in prices of structural material during 1903, the price of beams and channels up to 15-inch remaining steadily at 1.60 cents all the year. In the first three or four months of 1903 the structural mills were congested with tonnage, and in many cases premiums over regular prices were paid for prompt delivery. At the close of the year the mills had only a fair amount of tonnage on their books for 1904 delivery, but at the same time the outlook for the new year is regarded as very bright. A great deal of new work is in sight, much of which has been held over from 1903, and with an easier money market and labor troubles out of the way, it is believed the structural trade for 1904 will make a record that will exceed in tonnage the year just closed.

Sheets.—The sheet trade during 1903 was very satisfactory in the first three or four months of the year, but in the last half was dull and prices showed a heavy decline. There has been very little new capacity added in sheet mills in the past year and it is evident that the present sheet capacity is amply large enough to take care

of the requirements, even in times of an abnormal demand. In January No. 28 sheets were selling at 2.75 cents, but the demand was only fair. The market showed no material change until March, when the demand improved considerably and the mills were all fairly busy. This condition, however, did not last very long, and in May demand fell off very materially and prices became weaker. In July prices commenced to decline and from that time on until the close of the year the course of the market was steadily downward. In September No. 28 black sheets were selling at 2.60 cents, and before October closed 2.50 cents was being done. In this month the leading sheet interest took up the wage question and made a reduction of about 20 per cent. in nonunion sheet mills. In the last two months of the year the sheet trade was unsatisfactory, both as regards demand and prices, and the year closed with No. 28 sheets selling at 2.30 cents in carload lots. In December the union sheet mills, after several attempts, finally secured a reduction of 10 per cent. in wages and the removal of the limit of output. The market on galvanized sheets followed black sheets very closely, and at the close of the year galvanized sheets were selling at 80 and 2½ per cent. off, and in special cases 80 and 5 per cent. was made. The year closed with quite a number of sheet plants idle and there will have to be a very much better demand before all the mills will be able to run full time.

Plates.—In the first six months of 1903 the plate trade was very satisfactory, but in the last half decidedly unsatisfactory. The year 1903 opened with plate mills congested with tonnage and sold up for three or four months. This condition permitted some of the plate mills that had not sold so heavily to secure large premiums in prices for delivery of plates, and in some cases as high as 2 cents a pound was paid, being an advance of $8 a ton over the official price. This condition continued until about May, the larger mills in the meantime being compelled to turn down a large amount of tonnage on which they could not make deliveries. About June the demand for plates commenced to slacken, and the mills were catching up on contracts and premiums in prices disappeared. In the last three months of the year the demand for plates was dull, and a number of the leading mills were compelled to close down for lack of orders. The steel car trade, which uses a very large tonnage of plates, fell off very materially, and this had the result of causing a very slackened demand for plates. During the year the price was maintained steadily by the Plate Association on the basis of 1.60 cents, Pittsburgh, and the price has been renewed on this basis for 1904. In December the demand for plates commenced to improve, and it is thought that early in the new year tonnage will be larger, giving the mills more work. The Carnegie Steel Company have had under erection for some time a large plate mill at Homestead, which will be finished in March or April. Outside of the above there has been very little done in the direction of adding to plate capacity. During the current year, however, a large mill will be completed by the Lackawanna Steel Company.

Skelp.—In the early part of 1903 demand for skelp was only fair, and grooved iron was ruling at about 1.90 cents and sheared about 2 cents. The mills had a good deal of tonnage on their books, and in March prices showed a sharp advance, grooved selling up to 2.05 cents and sheared 2.15 cents. These prices ruled until about June, when, in sympathy with other lines of material, prices of skelp commenced to decline, and in December grooved iron was selling at about 1.50 cents, at mill.

Tubular Goods.—It is safe to say that the pipe market, taken as a whole, was better during 1903 than any other department of the finished iron and steel trades. The demand for the larger sizes all through the year was abnormally heavy, and it is said some large contracts involving a heavy tonnage of large pipe were held over until 1904, owing to inability of the pipe mills to make deliveries in the time specified. The heavy demand for the larger sizes of pipe continued all through the year, but in October, owing to labor strikes and other causes, demand for the smaller sizes fell off to some extent and on these smaller sizes the mills were making concessions in prices. The last two months of the year were somewhat quiet and at the close of December the leading interest issued a new price-list of tubular goods, which carried a reduction on nearly all sizes. The independent pipe mills have been working closely together for some months, and at a meeting held in Pittsburgh in the latter part of December a new schedule of prices was adopted to conform to those of the leading interest. The outlook for the pipe trade in 1904 is regarded as exceptionally bright.

Connellsville Coke.—The course of the coke market in 1903 was very erratic, high prices ruling in the early part of the year and low prices in the last three or four months, and with very light demand. The great activity in coke building during 1902 and in the early part of 1903 has resulted in an immense capacity for making coke, and the new concerns that have entered the field are seeking diligently for trade, and have recently made prices that in some cases are probably below actual cost of making coke. Owing to car shortage in the first four months of 1903, it was almost impossible at times to move coke, and a number of concerns were compelled to bank their ovens while waiting for cars to move coke piled up. This condition naturally led to high prices, and in the first four months of 1903 as high as $6 a ton was paid for furnace coke and $8 to $10 a ton for foundry coke for prompt shipment. Along in May the car supply became more plentiful and from that month the operators were able to get cars as fast as needed. In June and July the slackening demand for iron and steel commenced to be felt in the coke trade, as a number of blast furnaces had already blown out and others were preparing to do so. By October the shutdown movement was in full effect, a very large number of blast furnaces being idle, and demand for coke fell off at an alarming rate. The operators commenced to blow out ovens, and at the close of the year more than half of the 23,000 ovens in the Upper and Lower Connellsville regions were idle. With the falling off in demand for coke and the low prices ruling, it became evident that coke labor would have to come down, and about September 15 the Frick Coke Company posted notices at their various works in the Connellsville region notifying their men of a reduction in wages of about 16 per cent. This action was followed by the other operators and the men have accepted the cut almost without dissent. Low prices were ruling at the close of the year, Connellsville furnace coke having sold at low as $1.45 a ton for January and February shipment. Efforts were made to form a central selling agency, to handle the output of coke and at regular prices, but after a number of meetings had been held the project was given up as not being feasible. While some contracts for furnace coke for first six months of 1904 have been made on an exchange basis of so many tons of coke for a ton of iron, the majority of furnaces have not contracted for their supply. The large operators do not feel that they can sell coke for six months ahead at present low prices, and are disposed to bank down their ovens rather than sell coke at a loss. It is claimed that to the best equipped works coke at $1.50 a ton does not represent a profit. The large operators are not seeking the furnace trade for contracts, but are disposed to sell their product from month to month, in the belief that very early in the new year the coke trade will show improvement both in demand and prices.

New interests have taken hold of and revived the project of reclaiming the Hackensack (N. J.) meadow lands, and there are prospects that the scheme so long under consideration will be brought to a successful conclusion. The new syndicate have acquired contracts of the Hackensack Meadows Company, and have obtained the entire stock of the Webb-Mayer Syndicate, who were formerly conspicuously connected with the company. Work has been started to fill in the 3000 acres of meadow land by Hughes & Bangs, who have the contract for deepening the Bay Ridge Channel in New York harbor. The material being taken from the channel is used for filling in the meadow. It is estimated that the land, when filled in, will be worth $5000 an acre, will be particularly valuable for railroad yards, storage purposes and manufacturing plants. The new directors include Anson M. Bangs, president, the Federal Contracting Company; James Hughes, treasurer, the Federal Contracting Company; Frederick L. Eldridge, vice-president Knickerbocker Trust Company; F. D. Underwood, president Erie Railroad; Gen. Charles Miller, Standard Oil Company; Julius E. French, president Railway Steel Spring Company; W. H. Silverthorn, vice-president Railway Steel Spring Company; Samuel Calloway, president American Locomotive Company; Henry L. Sprague, and Frank A. Barnaby.

There has been in operation for nearly six months an electrically operated bar mill at the Bethlen Falva Works, at Schwientochlowitz, near Silesia. It consists of one stand of 17.71-inch three-high rolls, running at a speed of 60 to 110 revolutions, a second stand of 13.76-inch speeded at 150 to 230 revolutions and a finishing mill with seven stands of 10.24-inch rolls. The billet is 8.23 inches square, and weighs 500 pounds. All are driven by electric motors.

The Philadelphia Iron Trade.

BY THOMAS HOBSON, PHILADELPHIA, PA.

The condition of the iron and steel interests cannot be defined with much exactness, although they are going through a process which will probably lead to a better understanding in the near future. The position and influence that the great combinations will be able to maintain has been a matter of anxious concern ever since their inception, and although they have been under trial for a considerable period, there is still some doubt as to their ability to shape the course of events as they claimed they would do.

They did not meet expectations during 1901 and 1902, as prices advanced far beyond the limits which the great corporation fixed for themselves. This was shown by enormous imports which were made at dollars per ton beyond the "official" prices. The question that now confronts the trade, however, is whether they can hold prices at their present level, and, if they can, whether it is wise that they should do so.

The business world dreads unremunerative prices, wage reductions and everything that savors of unprosperous conditions. But history has clearly shown that such conditions follow abnormal prosperity, and after a period of adverse conditions there is again a gradual return to those of a more favorable character. The problem to be solved at the present time is whether the aggregations of capital, conducted and directed as they are by men of wide experience, will be able to control conditions so as to prevent periods of depression such as were experienced during the half decade 1892 to 1898. The question is so far-reaching that it would be presumptuous to attempt an answer until it has had a more extended trial than it has yet had. It is a frequent remark that no more iron would be sold at $14 a ton than there is at $15, and that is doubtless true as regards the present time; but by what process are we to get back to a consumption such as there was during 1902? Experience has shown that a decline such as there has been during the past six months, averaging one-half of the gain from the original starting point, is followed by a more or less vigorous attempt at recovery, which, however, is seldom permanent or important. This, indeed, appears to be characteristic of present conditions. One-half of the advance from the lowest to the highest was lost during the period from July to November, since which time some recovery has been made, and while the trade feel hopeful in regard to the general outlook, it cannot be said that better prices are looked for.

This leads back to the point whether it is better for the leading interests to meet the issue squarely and promptly by getting down to bedrock prices without further delay, or is it better to maintain them by combinations, price agreements, &c. Pig iron manufacturers have met the situation by curtailing the output, and that appears to work all right. Steel manufacturers attain the same end by a different method—viz., by price agreements. Of course with a limited demand for steel there must also be a limited output, but as regards pig iron no business is held up, because prices are too high. Steel occupies a somewhat different position. It is believed that orders for 1,000,000 tons or more of railway material are held in abeyance because of the failure to reduce prices. Billets are easily $8 lower than they were during 1902. Pig iron is also $8 lower, yet rails are unchanged from what they were when everything was at the highest. It is the opinion of the trade that the prices of steel rails must be reduced or other articles advance, and as no one expects the latter, it is not improbable that the rail situation blocks the way to general improvement. Orders for 1,000,000 tons of rails would not be excessive considering the mileage of the roads, but it would make a wonderful change in the steel situation. If the rails are wanted adjustments should be made, so that the work can be distributed at once. The moral effect would do much toward promoting a renewal of activity, which is and will be delayed until it is reasonably certain that prices are on a safe basis. As we said before, it is not yet clear whether prices can be controlled by the trusts, and it is yet to be seen whether they will use their influence and power wisely and well. New methods are on probation, but it will not be long before they can be estimated at something near to their true value. One claim is that demoralization in prices will not be permitted; the other that artificial conditions cannot be maintained indefinitely. A year from now these problems may have solved themselves, but at present the situation is largely tentative.

Prospects for 1904.

The outlook for business during 1904 is not specially encouraging. Naturally there are hopes of improvement, and there are some good reasons for expecting it. The country is prosperous as a rule the West and the South have been specially favored. Crops were good, and the returns will be much above the average, so that there is a substantial foundation to build on. The uncertain feature appears to be whether the losses of the past year have impaired the financial capacity to an extent which will necessitate further curtailments, or whether there has been a sufficient recovery to permit another forward movement. It is the fashion to belittle the movements in the security markets as being influential on the industrial situation, but they worked together during the rising tide; they worked together on the decline, and they are likely to do so during the coming year. The railways are the largest and most important consumers of iron and steel and their products, and as the orders that they give out depend largely on the financial situation it will be seen that the connection is extremely close. At the moment the outlook for new construction is not particularly inspiring. Many of the leading railways want money for refunding, and as the supply is limited, the appropriations for equipment are therefore likely to be kept within small compass. In some cases appropriations have been cut down almost to the bone, in others orders will probably be given out in dribs from time to time as may be necessary. In this respect the situation is far different to what it was during the several years immediately preceding. Then it was a question of getting deliveries, now it is a question of postponement. Of course, all this may be changed in course of a few weeks' time, but we are stating conditions as they are, rather than what is desired that they should be. A great deal of work will be done on terminals, bridges, &c., but in most cases it will be a long time before the specifications are out. The shipbuilding interests have nothing encouraging before them, and in that department 1904 will probably be rather a poor year. The building trade has been so badly used by labor organizations that the chances for activity in that direction are somewhat dubious. Taking everything into account, therefore, it is probable that 1904 will be more or less "an off year" compared with those of recent date. This narrowing down in general business may not be due so much to impaired conditions as to increased capacity, but until we catch up again the result will be almost the same. There is also the feeling of reserve which is usual during the year for a Presidential election, and while confidence in the continuance of the present administration is strong, a great many things might happen before the campaign is closed.

Labor is disposed to be more tractable, but the aftermath of the disturbed conditions in the building trades may be inimical to new operations for a long time to come. The unreasoning and the unreasonable spirit is not dead, although it is less assertive, but with the advent of renewed activity there would doubtless be the same old trouble. It is not pleasant to discuss matters of this kind, but business conditions during the coming year are sure

to feel the effects of last year's disturbances, so that the subject cannot be ignored. It is not necessary, however, to dwell on this feature, beyond saying that anything approaching great activity would probably be checked by the renewal of labor troubles. Some work is imperative, and a normal amount can be done on equitable terms, but it is only when the amount is abnormal that labor troubles become serious. Capital has been confronted with this to an extent that will be likely to check new enterprises in the immediate future. Work that must be done will be done, some that has been held up will be completed, but it would be extreme optimism to expect much beyond that. Neither the money market or the labor market is in a condition to encourage hopes of that kind, and if the iron trade absorbs 15,000,000 tons of pig iron during 1904, it is all that ought to be expected. Some good judges express the opinion that the chances are for a considerably smaller rather than a larger amount. The first named estimate would indicate a decrease of about 25 per cent. from the high water mark, and 10 to 15 per cent. better than the average of the last quarter of 1903.

The Presidential year, as we said before, is generally regarded as an off year, anyhow, but apart from that there are other influences which are likely to retard a complete recovery of lost ground, although they may pave the way for it at a later date.

A peculiar feature of the situation has been the complete and prompt reversal in the foreign trade. During the first half of the year imports were in large volume and of considerable value. During the last half of the year the return movement commenced, and at the close of the year the account will be pretty well evened up as regards 1903. It is hard to say to what extent the movement will be continued during 1904, but unless there is some marked improvement in the home trade, we shall probably export a tonnage equal to what was imported during 1902. It is a peculiar coincidence and shows that the battle for the world's trade is still undecided. The great upward movement in this country began with enormous exports during 1898 and 1899. In two years from that time the current was reversed, and we took back a tonnage almost equal to what we had sent out. Now there is another return movement, the extent and duration of which will depend entirely upon conditions in our own markets. A fair inference from these movements would be that we are approaching a period of greater uniformity in prices. Above a certain level of prices we shall be importers; below another level we shall be exporters. It will take time to determine where these levels will be found, but to-day's prices are probably somewhere about midway. The initial movement for either advance or decline may not necessarily be in the United States. Events may occur in Europe, or elsewhere, to cause most unforeseen changes, but it can be taken for granted that what affects other countries will find an immediate response in this country, especially as regards the iron and steel interests. Probably there has never been a time when the balance was as evenly poised as it is to-day. A very little change either way would make 1904 a fairly good business year or a very poor one. The country is in good shape to meet the latter if it should so prove to be, but there are reasons for expecting at least a fair average of prosperous conditions.

Pig Iron.

The Pig Iron market has been subject to wide fluctuations during the year, but not more so than might have been expected. The opening prices during January were about $23 for No. 2 X foundry, which proved to be the highest of the entire year. There was no material decline, however, during the first quarter, most of the business having been done at from $22.25 to $22.75. During the second quarter there was a loss of $3 per ton, and during the third quarter $2.50 to $3 more. During October prices were at the lowest, and averaged a decline of at least $7.50 from the highest point. Makers of Pig Iron, however, were quick to recognize the unfavorable conditions; and took immediate measures to prevent demoralization, measures which are now seen to have been both wise and effective. The output on December 1 was shown to be 241,407 tons weekly, as against 360,197 tons on the first of September—a decrease at the rate of over 6,000,000 tons per annum. This began to have its effect during the latter part of November, since which time the tone of the market has been slightly firmer, although it is hardly likely that it will lead to any distinct advance. The Alabama Companies were fierce competitors during the late summer months, and in the contest for business they unloaded a large tonnage both here and in the Central West, realizing in this market from $13 to $14 for No. 2 X foundry, according to deliveries. This for the time being nullified the action of the Northern furnaces in curtailing their output, but as the Southerners are now pretty well sold up, the market, from a statistical point of view, is in first-class condition. The question of prices during the coming year is, however, a matter of uncertainty, and with a reduced cost of production which is a matter of necessity, it will be no easy matter for the Southern companies to retain the apparent advantage which they secured during the past few weeks. The Northern furnaces intend to continue in business, and while they may be willing to share with their competitors, they are hardly likely to make an unconditional surrender. One reason for their recent quiescent attitude was probably for shrewd business considerations. They had a good deal of high priced iron to deliver, and if their customers could get some very cheap iron to go with it, they were rather pleased to have them do so, especially as their own costs for making Pig Iron were based on high priced materials. These are only transient conditions, however, so that the real test will be at a later date, maybe within a few weeks, or possibly during the early spring. The output will be very limited, however, during the next two or three months unless there is an unexpected increase in the demand. It will be good policy to prevent accumulations, and it will also have a tendency to lower the cost. Ore, fuel, lime, transportation and other items are too high considering the changed conditions, and costs of production must be reduced accordingly. It is claimed that present selling prices represent a certain and serious loss to producers of Pig Iron, and are only made tolerable by deliveries on old contracts at higher prices, and the expectation of lower costs on future deliveries.

The greatest production in the history of the trade was made during June and July, the output during the two months having been 3,455,570 tons, which was more than an entire six months' production during 1894, the total production for that year having been 6,657,388 tons. The decrease since July, however, has been very heavy. The November output has been only 1,073,840 tons, and will probably be still less during the current month, although it is expected that the tendency will be towards recovery in the near future. Stocks are pretty well run down, and under normal conditions it is believed that requirements will be considerably larger than at the present rate of output. But it is tolerably clear that things are not completely adjusted. Some good judges express themselves as believers in at least a 15,000,000 ton consumption during 1904. Others figure on 12,000,000 to 14,000,000 tons, but as the price will depend on the demand, or as some claim the demand will depend on the price, the latter is obviously somewhat uncertain. The year will begin with steady prices, but as already stated, it will not require much to give it a new character. Improvement is hoped for, and while there is not enough certainty in the outlook to say that the turn will be in that direction, there are at least some grounds for hoping that it will be, but it would be unwise to ignore the possibility of unfavorable developments. The course of the market is fairly indicated by the following quotations, which are the averages for each month:

	$	$
JANUARY 1.		
No. 2 X Foundry.	22.75 to	23.25
No. 2 Plain	22.00 to	22.50
Gray Forge	20.50 to	21.50
FEBRUARY 1.		
No. 2 X Foundry.	22.25 to	22.75
No. 2 Plain	21.50 to	22.00
Gray Forge	20.50 to	21.50
MARCH 1.		
No. 2 X Foundry.	22.25 to	22.50
No. 2 Plain	21.50 to	22.00
Gray Forge	19.50 to	20.50
Basic	20.00 to	20.50
APRIL 1.		
No. 2 X Foundry.	22.25 to	22.50
No. 2 Plain	21.50 to	22.00
Gray Forge	19.50 to	20.50
Basic	20.00 to	20.50
MAY 1.		
No. 2 X Foundry.	21.00 to	21.50
No. 2 Plain	20.50 to	20.75
Gray Forge	19.00 to	20.00
Basic	19.75 to	20.25
JUNE 1.		
No. 2 X Foundry.	19.50 to	20.50
No. 2 Plain	19.00 to	19.25
Gray Forge	18.00 to	18.50
Basic	19.00 to	19.25

	$	$
JULY 1.		
No. 2 X Foundry.	18.50 to	19.00
No. 2 Plain	17.75 to	18.25
Gray Forge	18.00 to	18.25
Basic	18.50 to	18.75
AUGUST 1.		
No. 2 X Foundry.	17.50 to	18.00
No. 2 Plain	16.50 to	17.00
Gray Forge	15.25 to	15.75
Basic	16.25 to	16.50
SEPTEMBER 1.		
No. 2 X Foundry.	16.50 to	17.50
No. 2 Plain	15.75 to	16.25
Basic	15.50 to	16.00
OCTOBER 1.		
No. 2 X Foundry.	15.75 to	16.50
No. 2 Plain	14.75 to	15.25
Gray Forge	14.25 to	15.00
Basic	14.75 to	15.00
NOVEMBER 1.		
No. 2 X Foundry.	15.00 to	15.75
No. 2 Plain	14.50 to	15.00
Gray Forge	13.75 to	14.25
Basic	14.25 to	14.50
DECEMBER 1.		
No. 2 X Foundry.	15.00 to	15.50
No. 2 Plain	14.25 to	14.75
Gray Forge	13.75 to	14.25
Basic	13.85 to	14.00

Steel Billets.

The billet trade has been of small proportions compared with what it was during the several years immediately preceding. One reason is that consumption has been smaller, and another that it has been of a less specu-

lative character. Consumers found that they would be able to get deliveries without much delay, and were therefore less disposed to place orders in advance of requirements. During the first three months of the year there was a fairly good demand at prices varying from $27 to $30, duty paid, for foreign steel, and $31.50 to $35 for American. Business was continued at about these prices during the second quarter, and was of considerable volume, but after that date there was a gradual decline in both price and demand. Concerns which previously and for years had been large buyers had completed their own plants, and instead of buyers they became pretty active sellers. The Lukens Iron & Steel Company and the Alan Wood Iron & Steel Company may be specially mentioned in this connection, their plants being the most up to date and as complete as any in the country. Besides these there are other important additions, so that the local demand can be well cared for by mills near at hand. During July and August prices kept around $28 to $29. September showed a decline of 50 cents to $1 per ton, which was followed by further recessions during October, while in November prices were down to $24.25 to $24.75, and have so continued to this date, a decline for the year of $8 to $10 per ton. Prospects for the coming year are considered fairly hopeful, and there is little doubt that the local mills will be amply able to maintain the strong position which they have already secured.

Plates.

The plate trade is one of great importance in Eastern Pennsylvania, as several of the largest and best equipped mills in the country are in this territory. Business during the first half of the year was in every respect satisfactory, although it soon became evident that the keen edge of demand was off. The leading consuming interest during 1902 was steel car building, although bridge, locomotive and boiler work was exceedingly active and contributed an immense business to the plate mills. January commenced with the mills full of orders, and prices at 2 cents and over for carload lots. This continued throughout the entire first quarter of the year, but the demand was less urgent, and toward April prices were much easier. The second quarter began with quotations about 1.90 cents, but gradually weakened, until in May good business was taken at 1.80 cents. During June further weakness developed, and from that time to the present 1.75 to 1.80 cents has been the ruling quotation for carload lots as a minimum quantity. The immediate situation is not very satisfactory; neither are prospects what could be desired. The largest consumers of plates are doing less business than for a considerable time past, and prospects for improvement are by no means encouraging. Car building is dull, comparatively speaking, orders for locomotives are decreasing, shipyards and boiler shops are doing very little, so that the demand for plates may be very much less than during 1902 and 1903. Bridge building promises fairly, and a good deal may be done for engineering and constructing work, but with a diminished demand from the interests named, it will be difficult to maintain full employment for the enlarged capacity which is now available. Prices are fixed at 1.73½ cents, base, Philadelphia, for ordinary ¼-inch plates, and it is said that no change in prices will be made before July, and not then unless there is some unforeseen change in conditions.

Structural Material.

The volume of business during 1903 has been materially less than during the year previous. This was largely due to strikes in the building trades, although the general demand showed a considerable falling off. Prices were nominally the same, but premiums of $10 to $20 per ton, which were paid during 1902, and to some extent early in 1903, are now entirely lost, and at 1.60 cents base, Pittsburgh, plus freights to delivery points, it is an easy matter to get shipments as promptly as required. Manufacturers appear to be sanguine in regard to the outlook for the coming year, as they have already a very heavy tonnage on their books, but in most cases it is a long way ahead, and under the most favorable conditions specifications will not be in before Spring, and are likely to be spread over a very extended period. What is most needed is immediate work, and that unfortunately is scarce, and may continue so for several weeks to come.

The shipyards are doing very little, the bridge shops are not pushed with work, while the building trade is still very unsettled. So that while manufacturers are hopeful in regard to the ultimate outcome, there is certainly nothing encouraging in prospect for the winter months. The new mill of the Eastern Steel Company, at Pottsville, is expected to be a candidate for business at an early date, so that even with a big demand the capacity for supplying it will be larger than ever before.

Bars.

The Bar Trade has been unsatisfactory during the entire year. Prices of Refined Iron began in January at 1.95 cents, but the high price and scarcity of fuel and other materials left little or no margin for manufacturers. Prices were fairly maintained during the second and third months of the year at 1.90 and 1.95 cents, but there was a feeling that conditions were not right, and that price agreements were not maintained. This culminated during the fourth month with a virtual dissolution of the Pool, and an open market with prices varying from 1.60 to 1.65 cents. During August there was a further decline to 1.55 cents, in September to 1.50 cents, in October to 1.45 cents, in November to 1.40 cents, and in December to 1.35 cents. An agreement was entered into last month, however, that production should be decreased one third, at such times as would be most convenient to each mill, that is to say, during one week in three, or two days a week, no work should be done. This agreement is still in force, but the suspension will probably be more extended on account of the holidays. The demand is very light, however, and Bars are freely offered at 1.35 cents for car load lots of Refined Iron.

Steel Bars began at 1.73½ cents in January, and were held at that figure until November, when the base price was reduced to 1.30 cents, Pittsburgh, equivalent to 1.43½ cents, Philadelphia. At times it was difficult to get deliveries of Steel Bars from the West, local mills therefore obtained a tenth to two-tenths more for prompt shipments, but there appears to be no difficulty now in getting anything that may be wanted, and as promptly as wanted, at the usual quoted rates.

Prospects are not very encouraging for the Bar trade, although coal and scrap material have had a very heavy decline. The difficulty is to get business enough to run economically, but with steel bars at present figures, competition is likely to be very close, so that neither price or volume of business is likely to be satisfactory.

Sheets.

The sheet trade has been rather unsatisfactory during the past year. The tonnage has been fairly maintained, although September, October and November were unusually dull months, but December shows a considerable improvement, so that the average will not be so very bad. There is at the present time quite a large inquiry for deliveries during the first quarter of 1904, and it looks as though better times were at hand for the sheet trade. Prices have been continuously weak until recently, but with an improved demand and cheaper raw material, there is a better prospect for manufacturers during the coming year.

Old Material.

The trade in old material during 1903 was one of remarkable fluctuations. Prices have in some cases been cut in two; in others the decline was 30 to 40 per cent. The highest prices were during March, April and May; the lowest during November and December. This may be accounted for in several ways, one being that in the early portion of the year the railways were too crowded with freight to pay much attention to their scrap material; consequently it was almost impossible to get deliveries. Those who had scrap bought were then most anxious to get deliveries, and as usual when there is a little scarcity, they all get afraid, and make believe that shipments are wanted a great deal more than they really are. When the turn is in the other direction, sellers take alarm and for a while they do the crowding. This feature has probably exhausted itself, and prices are now believed to be as low as they are likely to go. Some business has been done for export, but nothing of importance, and for the present it is hardly likely that there will be. Old steel rails from Southern ports to the Mediterranean may possibly go through, but it will depend on freights and the prospects for recovery in our own markets. Prices during the various months of the year average as follows:

JANUARY.

Low Phosphorus Scrap	$26.50 to $27.50
Heavy Melting Steel	20.00 to 21.00
Choice Railroad Scrap	22.50 to 23.50
Country Scrap	20.00 to 21.00
Machinery Cast	19.75 to 20.25
Wrought Turnings	16.00 to 16.50
Cast Borings	10.00 to 10.50
Old Car Wheels	20.00 to 21.00
Steel Axles	25.00 to 26.00
Iron Axles	29.00 to 30.00

FEBRUARY.

Low Phosphorus Scrap	$26.50 to $27.50
Heavy Melting Steel	20.00 to 21.00
Choice Railroad Scrap	22.50 to 23.50
Country Scrap	20.00 to 21.00
Machinery Cast	19.75 to 20.25
Wrought Turnings	17.00 to 17.50
Cast Borings	10.50 to 11.00
Old Car Wheels	20.50 to 21.50
Steel Axles	25.00 to 26.00
Iron Axles	29.00 to 30.00

MARCH.

Low Phosphorus Scrap	$27.00 to $28.00
Heavy Melting Steel	20.75 to 21.50
Choice Railroad Scrap	23.50 to 24.00
Country Scrap	21.00 to 22.00
Machinery Cast	20.00 to 21.00
Wrought Turnings	17.50 to 18.00

Cast Borings	11.00 to	11.50
Old Car Wheels	24.50 to	25.00
Steel Axles	26.00 to	27.00
Iron Axles	30.00 to	31.00

APRIL.

Low Phosphorus Scrap	$27.00 to	$28.00
Heavy Melting Steel	20.75 to	21.25
Choice Railroad Scrap	23.00 to	24.00
Country Scrap	21.00 to	22.00
Machinery Cast	20.00 to	21.00
Wrought Turnings	16.50 to	17.00
Cast Borings	11.50 to	12.00
Old Car Wheels	24.50 to	25.00
Steel Axles	26.00 to	27.00
Iron Axles	30.00 to	31.00

MAY.

Low Phosphorus Scrap	$28.00 to	$29.00
Heavy Melting Steel	20.75 to	21.50
Choice Railroad Scrap	23.00 to	23.50
Country Scrap	19.50 to	20.50
Machinery Cast	19.50 to	20.50
Wrought Turnings	17.50 to	18.00
Cast Borings	11.25 to	11.75
Old Car Wheels	24.00 to	25.00
Steel Axles	26.00 to	27.00
Iron Axles	29.00 to	30.00

JUNE.

Low Phosphorus Scrap	$28.00 to	$29.00
Heavy Melting Steel	20.50 to	21.00
Choice Railroad Scrap	22.50 to	23.00
Country Scrap	19.00 to	19.50
Machinery Cast	18.50 to	19.50
Wrought Turnings	15.50 to	16.00
Cast Borings	10.75 to	11.25
Old Car Wheels	22.50 to	23.50
Steel Axles	26.00 to	27.00
Iron Axles	28.00 to	29.00

JULY.

Low Phosphorus Scrap	$26.00 to	$28.00
Heavy Melting Steel	19.50 to	20.00
Choice Railroad Scrap	20.50 to	21.00
Country Scrap	19.00 to	19.50
Machinery Cast	18.00 to	19.00
Wrought Turnings	15.00 to	15.50
Cast Borings	10.00 to	10.50
Old Car Wheels	21.50 to	22.50
Steel Axles	22.00 to	23.00
Iron Axles	26.00 to	27.00

AUGUST.

Low Phosphorus Scrap	$26.00 to	$27.00
Heavy Melting Steel	18.00 to	18.50
Choice Railroad Scrap	18.00 to	18.50
Country Scrap	16.50 to	17.00
Machinery Cast	17.00 to	17.50
Wrought Turnings	14.50 to	15.00
Cast Borings	8.50 to	9.00
Old Car Wheels	19.50 to	20.50
Steel Axles	20.00 to	21.00
Iron Axles	21.50 to	22.50

SEPTEMBER.

Low Phosphorus Scrap	$24.00 to	$25.00
Heavy Melting Steel	16.25 to	16.50
Choice Railroad Scrap	17.00 to	18.00
Country Scrap	15.00 to	16.00
Machinery Cast	15.00 to	16.00
Wrought Turnings	11.50 to	12.00
Cast Borings	7.75 to	8.25
Old Car Wheels	19.00 to	20.00
Steel Axles	18.00 to	19.00
Iron Axles	21.00 to	22.00

OCTOBER.

Low Phosphorus Scrap	$22.00 to	$23.00
Heavy Melting Steel	14.75 to	15.25
Choice Railroad Scrap	17.00 to	17.50
Country Scrap	14.00 to	15.00
Machinery Cast	14.50 to	15.00
Wrought Turnings	10.50 to	11.00
Cast Borings	7.25 to	7.75
Old Car Wheels	16.50 to	17.00
Steel Axles	18.00 to	19.00
Iron Axles	19.00 to	20.00

NOVEMBER.

Low Phosphorus Scrap	$20.00 to	$21.00
Heavy Melting Steel	12.00 to	12.50
Choice Railroad Scrap	16.00 to	16.50
Country Scrap	14.00 to	14.50
Machinery Cast	13.00 to	14.00
Wrought Turnings	10.00 to	10.50
Cast Borings	7.00 to	7.50
Old Car Wheels	15.00 to	16.00
Steel Axles	16.00 to	17.00
Iron Axles	19.00 to	20.00

DECEMBER 1.

Low Phosphorus Scrap	$18.00 to	$20.00
Heavy Melting Steel	11.50 to	12.00
Choice Railroad Scrap	14.50 to	15.50
Country Scrap	13.00 to	14.00
Machinery Cast	13.00 to	14.00
Wrought Turnings	8.50 to	9.50
Cast Borings	6.25 to	6.75
Old Car Wheels	12.75 to	13.50
Steel Axles	14.00 to	15.00
Iron Axles	16.00 to	16.50

The manufacturers of Sharon and Ellwood City, Pa., have been performing many acts of charity toward the poor of these communities during the past holiday season. Practically all the manufacturers of Sharon subscribed liberally toward the relief work. The Merchants' and Manufacturers' Club of Ellwood City also did good work in helping families needing assistance on account of the long idleness of the mills.

The Wieland Pipe Threading and Cutting Machine.

In general design and in numerous points of outward appearance the Wieland machines for cutting and threading pipe bear a definite resemblance to various modern machine tools of the lathe type. As shown by the engraving, Fig. 1, the bed or frame is a single casting of the box pattern, affording rigid and ample support for the working parts of the machine and enabling the structure to best endure the severe stresses to which a machine of this nature must necessarily be subjected.

The machine is triple geared. A three-step cone pulley with the small pinion attached to it at its left hand end and incased, as shown in the illustration, runs loose upon the supporting shaft. This small pinion meshes with the gear upon the shaft below the cone. Adjacent to the large end of the cone, and keyed to the shaft, are two gears, so spaced that either of the pinions upon the lower shaft may be brought into action without interference between the other pair. These pinions are mounted upon a sleeve splined to the shaft, and moved to right or left by a rack and pinion device, as shown. At the extreme right hand end of the shaft supporting the step cone is a pinion meshing with the large driving gear on the main spindle of the machine. Thus not only is the machine triple geared, but, in addition, the middle train of this gearing is doubled, so as to provide two speeds of the main spindle for each cone speed corresponding to the three steps. All gears, including racks and pinions for operating the carriage and shifting the intermediate gearing, are machine cut, the pinion driving the main spindle gear being of steel.

Two chucks are used on the main spindle, both entirely similar and of the type commonly used on large engine lathes. Each has tool steel one-piece independent jaws projecting beyond the face of the shell. On the rear chuck the projecting jaws provide efficient means for holding flanges. On the front chuck the advantage of using this same style of jaw lies in the ability thus provided for holding short nipples, the operator being able to see just where the pipe is being gripped, without having to look into the interior of the chuck.

Some new features are involved in the construction and operation of the die mechanism, these features including both the manner of entering the interchangeable chasers in the die head and the method of their adjustment and control when in use. By reference to Fig. 2 it may be seen that the lower chasers, numbered 1, 2 and 3, are inserted from the bore of the die head; the upper chasers, 4, 5 and 6, are put into place through openings in the periphery of the cam ring B. Opposite each lower chaser there is also an opening in the periphery of the cam ring, through which openings the slots or ways in which the chasers travel may be cleaned without removal of the cam ring. Pins in the upper chasers and slight projections into the openings opposite the lower chasers are effective in retaining each chaser positively in place. By this construction the possibility that the chasers may fall out is avoided, and the difficulty sometimes experienced from this cause in ordinary die heads is removed.

The ring B is rotated through a suitable arc by means of the lever F and its connections to the post D. In Fig. 1 this lever is shown in working position for operation of the chasers in threading pipe. In Fig. 2 the lever is elevated and thrown back to rotate the cam ring B to the extreme position, such that chasers may be removed from the die head. The action of lever F is evident from Fig. 2, wherein H is a fulcrum block fitted between suitable guides and tapped to suit the adjusting screw K cut with a left hand thread. The connecting rod E joins the lever F to the post D attached to the cam ring B. Adjustment of the fulcrum block is, of course, made by rotating the screw K by means of the gashed rim hand wheel. Moving the fulcrum block to the left decreases the threading circle of the chasers, and *vice versa*. As plainly shown in Fig. 2, the upper guide for the fulcrum block H is graduated in inches and fractions. On the fulcrum block itself is scribed an index line, which indicates by

its position relative to the scale of inches on the upper guide the diameter of pipe for which the chasers will be properly adjusted when the lever F is in the closed position, Fig. 1. The cam ring operating mechanism is of the toggle joint type. By reason of the curved fin G on the under side of lever F the toggle joint pin centers are

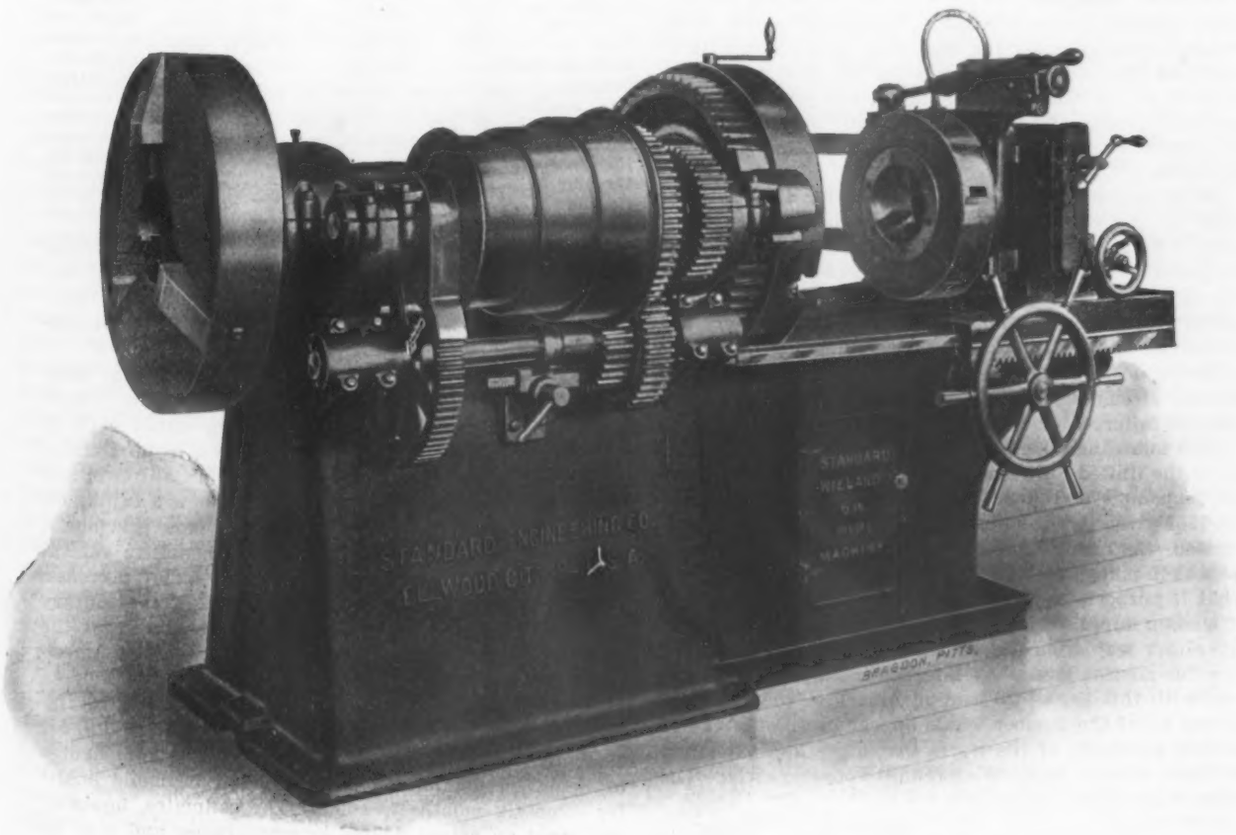


Fig. 1.—General View of the 6-Inch Machine.

maintained in a straight line at all points of adjustment of the fulcrum block H when the lever fin is brought to bear upon its projecting rest or stop M. It therefore follows that when the lever F is raised to rotate the cam

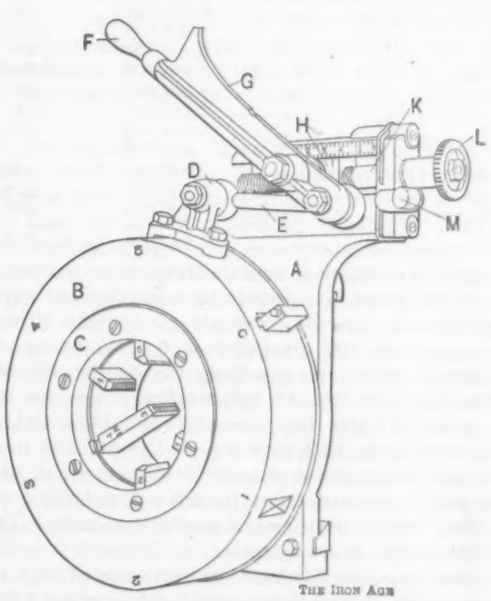


Fig. 2.—Die Mechanism in Extreme Open Position.

ring B the chasers are at once withdrawn without first being even slightly crowded into the threads of the pipe.

The chasers are unusually deep, those for 6-inch pipe cutting a perfect thread or screw 1¾ inches long. This is of advantage in several ways. For one thing it enables the cutting of a full taper thread for fittings tapped to extra depth. It also allows the entrance to the chasers to be ground, while still leaving depth enough for the standard length of thread. The makers claim to furnish chasers by which open hearth steel pipe may be threaded in one cut as rapidly as the ordinary wrought iron pipe.

For cutting pipe to length the die head A may be slid to one side. In removing pipe from the machine the sliding die head is of advantage in preventing the ruining of the bottom chasers, as frequently results in machines having fixed die heads, by the necessity for dragging the pipe across the dies in removing it from the machine. The cutting off slide is fitted with a lathe tool post, by setting which at the proper angle the burr may be bored out of the end of the cut pipe without using a reamer. The slides for steadying the pipe while being cut to length are universal and have removable steel edges or facings.

The countershaft has two friction pulleys, this provision being also claimed as a new departure in machines of this character. The makers are the Standard Engineering Company, Ellwood City, Pa., of whose product the machine illustrated constitutes a single item in a large line of types and sizes.

There were 1070 petitions in bankruptcy filed in the clerk's office of the United States District Court of New York during the year 1903, and 698 discharges were granted. Several involuntary petitions were dismissed, as the creditors could not prove the allegations, and others were dismissed by consent of creditors, settlements having been made. Six thousand six hundred and eight petitions have been filed since the present Bankruptcy act went into force on August 1, 1898. At least 60 persons have gone into bankruptcy twice, and one person three times.

The Central Iron & Steel Company, Harrisburg, Pa., on January 1, broke all records for long sheared plates, mill No. 1 turning out sheared plates for the Pheonix Iron Company, to be fabricated for the Chesapeake & Ohio Railroad Company, 55 feet, 4½ inches in length, 58 inches wide and 7-16 inch thick.

The American Copper Industry.

BY HORACE J. STEVENS, HOUGHTON, MICH.

The year just past has not been an entirely satisfactory one to the American copper industry, but it was much better than 1902, which witnessed a falling market and a general demoralization. While 1903 closes with prices materially under the best of the year, and with a slackened demand, the prospects for the new year may fairly be called good. The best mines will probably make handsome profits, and there is no reason for thinking that the production will not show at least a normal increase over 1903.

Much confusion has been caused during the past five years by the efforts of the Amalgamated Copper Company to secure control of American copper mining, with the probable intention of ultimately reaching out for control of the copper trade of the world. These plans have miscarried, owing to a number of important matters not calculated upon when the plans were made. Litigation in Montana has hampered development at home, and two several attempts to control prices were equally pronounced failures.

The following table gives the 26 leading copper producers of the United States, with their approximate 1903 output in pounds of refined copper, with actual production for 1901 given in the second column for purposes of comparison. As exact figures will not be available for some months in many cases, the table must be taken merely for what it purports to be, which is an estimate of products of leading mines, which will vary by but a small percentage either way from the actual figures, to be made public some months later. An interesting feature in connection with this list of 26 leading American copper mines is that all of the number would appear in a list of the 41 leading producers of the world that make approximately 8,000,000 pounds or more of refined copper yearly. The table is appended:

	Estimated, 1903.—Pounds.	Actual, 1901.—Pounds.
Anaconda	95,000,000	98,000,000
Calumet & Hecla	80,000,000	82,519,676
Boston & Montana	75,000,000	55,000,000
Copper Queen	35,750,000	39,781,333
United Copper Company	32,000,000	29,898,980
United Verde	30,000,000	34,520,695
Arizona Copper Company	28,500,000	20,638,995
Mountain Copper Company	25,000,000	26,174,019
Calumet & Arizona	25,000,000	.....
Quincy	18,750,000	20,540,720
Butte Reduction Works	18,000,000	17,969,663
Osceola	16,000,000	13,723,487
Tamarack	15,750,000	18,000,852
Detroit Copper Company	15,000,000	17,535,000
Utah Consolidated	12,500,000	9,164,978
Tennessee	12,000,000	1,700,665
Bingham	12,000,000	5,400,000
Champion	11,000,000	.....
Baltic	10,500,000	2,641,432
Trimountain	10,000,000	.....
Wolverine	9,100,000	4,946,126
Old Dominion	9,000,000	10,094,787
Butte & Boston	9,000,000	11,500,000
Colorado M. & S. Company	9,000,000	10,150,000

Production of copper by the various producing States of the Union has been as follows, in pounds:

State	1902.	1901.
Montana	288,903,820	229,870,415
Michigan	170,820,593	155,716,848
Arizona	119,944,944	130,778,611
California	25,038,724	33,667,456
Utah	23,939,901	20,116,979
East and South	13,599,047	6,860,039
Colorado	8,422,030	9,801,783
New Mexico	6,614,961	9,629,884
Wyoming	889,228	2,698,712
South Dakota	445,663	753,510
Idaho	227,500	480,511
Washington	209,297	.....
Nevada	164,301	593,608
Miscellaneous	500,000	531,530
Totals	659,720,009	601,499,886
From imported ores and mattes	40,000,000	64,000,000
Grand totals	699,720,009	665,499,886

Figures regarding 1903 production are necessarily estimates only, and consequently subject to considerable revision in the light of the final figures, which will not be completed for more than six months. The following statement, while necessarily an estimate only, may be considered as a fair approximation of the real products of the various States and districts named:

State or district.	1903.—Pounds.
Montana	260,000,000
Michigan	199,650,000
Arizona	150,000,000
California	28,000,000
Utah	37,000,000
East and South	19,000,000
Colorado	8,000,000
New Mexico	8,000,000
Wyoming	2,000,000
South Dakota	700,000
Idaho	300,000
Washington	300,000
Nevada	300,000
Miscellaneous	1,000,000
Total	714,250,000

The preceding estimate allows for an increase of 54,529,991 pounds in purely domestic production, as compared with an increase of 58,220,123 pounds in the preceding year:

A strange feature of the preceding list is that Montana, Michigan and Arizona, the three leading copper fields of the United States, have seven mines each in the list of the 25 largest American mines, while Utah, a comparatively new producer, has two, and California and Tennessee have one each. Eight mines show a falling off in production, as compared with two years previously, but in every case the reduction is small, and in several cases the official figures may show no actual decrease. Four of the 25 greatest copper producers of the country made no copper at all two years ago, showing that the new mines are a highly important feature of the American copper supply.

The Lake Superior region has shown quite an increase. The following table gives actual outputs for 1902, and estimated products for 1903. The final figures of actual production for 1903 will not be made public for some six months to come. The estimates, however, are based on actual figures in many cases, and may be accepted as close approximations in all instances:

Mine.	1903.	1902.
Calumet & Hecla	80,000,000	81,248,739
Quincy	18,750,000	18,988,491
Osceola	16,000,000	13,416,396
Tamarack	15,750,000	15,961,528
Champion	11,000,000	4,165,784
Baltic	10,500,000	6,285,819
Trimountain	10,000,000	5,730,807
Wolverine	9,100,000	6,473,181
Mohawk	6,750,000	908,479
Atlantic	5,500,000	4,949,366
Franklin	5,400,000	5,259,140
Isle Royale	3,300,000	3,569,748
Adventure	3,000,000	606,211
Mass	2,750,000	2,345,805
Winona	1,000,000	101,188
Phœnix	350,000	.....
Michigan	300,000	133,373
Centennial	100,000	74,667
Miscellaneous	100,000	380,599
Totals	199,650,000	171,199,322

Michigan has made a notable increase in production of upward of 28,000,000 pounds in a single year—much the greatest ever secured. The old mines show little or no increase, with the exception of the Wolverine, the added copper coming mainly from the Baltic, Trimountain, Champion and Mohawk mines—four properties, born in the boom of 1899, that already rank high and are destined to rank much higher among the big and profitable copper mines of the country. Michigan will show a substantial increase in 1904, though not so large a gain as in 1903, and will increase production rather more slowly for several years to come.

Montana remains the heaviest producer of any copper field of the United States or of the world. Litigation hampers development, with no prospect of an early settlement. The Anaconda is no longer the rich mine of yore, but the Boston & Montana is a worthy successor. The principal new development under way is the mine and smelter of the Pittsburgh & Montana, the latter planned on a new system, soon to be given a trial. Various copper fields outside of the Butte district report renewed activity.

Arizona is the scene of the most pronounced activity in copper mining developments to be noted in any part of the United States. This territory has four largely developed districts, these being, in order of present importance, the Bisbee district of Cochise County, the Clifton-Morenci field of Graham County, the Jerome field of Yavapai County and the Globe district of Gila County. The Copper Queen, at Bisbee, will soon be able to increase production, with new shafts and a fine new smelter at Douglas, which will do a good deal of custom work, besides smelting the Copper Queen ores. The Calumet & Arizona is the best copper mine opened in the United States for a number of years, and paid its first dividend only 13 months after blowing in its smelter. Allied with this are four adjoining properties, three of which promise to make good mines. In Graham County the old producers are progressing, and the Shannon has earned its right to a permanent place among the big mines. Several other properties of promise are undergoing development. In the Yavapai County field there are innumerable copper mining corporations, but the United Verde remains the only property of importance thus far. In Gila County an amalgamation of the Old Dominion and United Globe mines, under the experienced management of Phelps, Dodge & Co., will make one good mine out of two that have never proven successful. Outside of the four districts already named in Arizona, there are a score of others, several of which are of considerable promise. The Imperial property and various others bid fair to make large producers in time. The copper prospects of Arizona are very bright, and eventually this territory must take precedence of both Montana and Michigan as a producer of the red metal.

California is not coming to the front as a copper producer as rapidly as was anticipated would be the case a few years ago. The Mountain remains the only big mine in the State, with the Bully Hill a good small mine. Several other smaller producers are scattered throughout the State. The principal production continues to come from Shasta County, though a little copper is secured from a score or more of the different counties.

Utah has made a substantial gain in production during 1903, and the future of the industry in that State is no longer subject to doubt. The gold and silver values carried with the copper aid greatly in making profitable mines. In Beaver County the Majestic, a promising mine, has become ensnarled in litigation and financial difficulties. The Beaver County district is, upon its face, one of the most promising of the undeveloped copper fields of the country, and will probably become important in time. Nearly every county in Utah has copper ores, and mining development is under way on a small scale at a number of different points outside of Salt Lake and Beaver counties.

In the Appalachian district the Tennessee Copper Company have established the soundness of copper mining in this field. The property is an old one, abandoned during the Civil War and recently reopened. They have had the benefit of the most experienced and expert management, and probably hold the record for the cheapest smelting costs ever secured on copper ore in this country or abroad. In the neighborhood of the Tennessee, in the States of Tennessee, Georgia and Alabama, are several rather promising mining ventures not yet on a productive basis. In the Virginia-North Carolina district a little progress has been made during the year, and copper mining will probably increase in this field. In Maryland the various boom companies formed to open old mines have nearly all come to grief. New Jersey has failed to become the producer of copper predicted several years ago by those interested in its mines. A little desultory scatching has been done in Pennsylvania also, but nothing of a really serious nature seems to be doing at present. In New England the Copperfield mines of Vermont are being operated by the Westinghouse interests, and are producing on a small scale.

Colorado produces 8,000,000 to 10,000,000 pounds of copper annually as a by-product from silver-lead and other ores. On the northern boundary, near Wyoming, a number of small companies are doing development work, mostly with insufficient capital.

New Mexico has proven disappointing as a copper field. A few small mines continue working, and obtain respectable products, considering the limited scale of their operations, but the big mines that have been promised in every copper boom for the past quarter century remain to come.

Wyoming has 200 or more copper mining companies, mostly with just enough money to do a little more than their assessment work. There are several promising properties under development, of which one, the North American Copper Company, is a large enterprise, backed by capital, and with sufficient development and equipment to render the test a fair one. The output of this company for 1903 was small, but it is expected that regular production will be begun shortly.

Several copper companies are operating in the Black Hills district of South Dakota. Of these the Dakota-Calumet seems the most important and best advanced. The ores are low grade, but are found in large quantities.

Idaho has large copper deposits, of which the most promising are in the Seven Devils district, near the Washington line. The White Knob Company, in the middle of the State, have considerable development and good equipment, but for some reason do not seem to get down to actual production upon any considerable scale.

In Washington, copper ores are scattered in nearly every part of the State. The Index district seems the most advanced, and it is probable that some regular producers will be developed there within the next year or two.

Nevada has some good bodies of copper ore, mostly so located as to be inaccessible, or nearly so. In time Nevada will become a considerable producer of copper, but as to when that time will be, it is unsafe to pronounce.

A mine is being opened in Wisconsin, on the western extension of the Keweenawan synclinal, which carries the cupriferous strata of the Michigan district. The extreme western end of this belt is noted in Northeastern Minnesota. Copper ores have been found in Oklahoma, and several attempts at copper mining have been made in Texas, at least one enterprise of this nature being in process of development at the present time.

Alaska has furnished some marvelous and it is to be feared not overly veracious tales of immense copper deposits during the past few years. That the claims of copper in Alaska have a solid basis of fact in some instances is being proven by the development of promising mines along the coast. Several of these will become producers shortly, and will start production under favorable circumstances. There are also copper measures in the interior of Alaska that will doubtless make good mines in time, though as yet so difficult of access that they can hardly be regarded as more than possibilities for some time to come.

The General Electric Company of Lynn, Mass., will furnish the Newcastle-Tynemouth lines of the Northeastern Railway of England with equipment for motor and trail cars. The British Thomson-Houston Company will furnish two freight locomotives, and the American company will equip 29 three-car trains with controllers and motors. The end cars will be motors, the central a trailer, one train loaded to weigh 100 tons. Two General Electric 66 railway motors on one truck will be furnished each car, as well as an automatic controller arranged to secure automatic acceleration and supplied with a cut off that operates air brakes in case the motorman removes his hands from the operating crank. This is the same system as that for the New York Central Railroad's underground service.

The improvements made by the Pennsylvania Railroad Company in 1903 were the largest in the history of the company. The expenditures by the maintenance of way department alone amounted to nearly $20,000,000, and fully as much was spent by the chief engineer's department. In all about $50,000,000 has been spent to improve the physical condition of the company's properties.

An Interesting Year in Tin Plates and Sheets.

BY B. E. V. LUTY, PITTSBURGH, PA.

In several respects the year 1903 was a particularly interesting one in the sheet and tin plate industries. Trade developments showed in a striking way that control of the market by the United States Steel Corporation depends quite strictly upon the quantity of independent competition, since with a much greater amount of independent competition in sheets than in tin plate the spread between the two, tin plates above sheets, increased greatly and almost steadily during the year. The year marked the substantial success of what has been aimed at by engineers for 15 years, a process for rolling thin steel sheets, continuous or semicontinuous in its operation, by which at least a large part of the manual labor would be dispensed with. That this desideratum has actually been achieved in a commercial way is not doubted in inside circles. The first commercially important sales of tin plate in competition with practically duty free Welsh tin plate were made during the year through the wage concession granted by the workers on such orders. The United States Steel Corporation demonstrated their possession of much cheaper steel than their transatlantic rivals in sheet and tin plate manufacture by paying the freight and selling them large tonnages of sheet bars at less than they could buy elsewhere, and these three developments indicate in an unmistakable way that 1903 laid a substantial foundation for the early establishment of an export trade in tin plates and sheets, the one important iron and steel line in which the United States had not heretofore demonstrated by actual practice its ability to successfully compete with foreign manufacturers in the markets of the world. The year showed interesting developments in other directions also. It will be convenient to treat sheets and tin plate together, since they are so closely allied, and where they are distinguished from each other it is mainly to study their inter-relations. Their strictly cognate character is recognized in the consolidation, at the close of the year, of the tin plate and sheet subsidiaries of the Steel Corporation. The new American Sheet & Tin Plate Company will be an actual consolidation all along the line, not the mere grouping of two distinct departments under one corporate name.

General Alignment of the Industry.

The plants completed and being built were approximately as follows on January 1, 1903:

	Sheet.		Tin plate.	
	Plants.	Mills.	Plants.	Mills.
Corporation completed	20	164	22	264
Independent completed	32	136	10	71
Totals completed	52	300	32	335
Independent building	7	43	9	63
Grand totals	59	343	41	398

This summary includes the Sharon Tin Plate Company with the Steel Corporation; it ignores entirely the Sharon Sheet Steel Company, as there is no logical place in the table for them; the number of plants being built refers only to entirely new plants; the number of mills being built includes mills being added to plants having completed mills.

During the year there were completed and put in operation the following:

Sheet Mills.

Ashland Sheet Mill Company, Ashland, Ky., four additional sheet mills.

Canonsburg Steel & Iron Works, Canonsburg, Pa., plant purchased in 1902 from American Tin Plate Company and idle by agreement until 1903; then put in operation as a five-mill sheet plant.

Huntington Tin & Planished Plate Company, Huntington, W. Va., four-mill plant completed, but subsequently abandoned and sold to be used as a rail rerolling plant.

Inland Steel Company, Indiana Harbor, Ind., eight-mill plant.

Tin Mills.

Griffiths Charcoal Iron Tin Mills, Washington, Pa., two-mill plant.

W. H. Griffiths Company, Waynesburg, Pa., five-mill plant.

Jackson Iron & Tin Plate Company, Clarksburg, W. Va., three additional mills completed, making eight-mill plant.

Juniata Steel & Iron Company, Greencastle, Ind., six-mill plant.

Marietta Sheet & Tin Plate Company, Marietta, Ohio, four-mill plant, now United Sheet & Tin Plate Company.

McKeesport Tin Plate Company, McKeesport, Pa., 10-mill plant.

Pope Tin Plate Company, Steubenville, Ohio, five additional mills, making 12-mill plant.

Standard Tin Plate Company, Canonsburg, Pa., four-mill plant; just about completed.

The changes which the United States Steel Corporation made during the year were almost altogether in the direction of moving mills from one location to another.

At some points where new erection was in progress at the beginning of the year work has probably been permanently discontined. Unfinished projects of importance, which are represented in the summary of new erection on January 1, 1903, are:

Colorado Fuel & Iron Company, Pueblo, Col., ten tin mills and eight sheet mills.

Follansbee Brothers Company, Wellsburg, W. Va., four tin mills and four sheet mills.

Rolling Mill Company of America, Morgantown, W. Va., ten tin mills.

This leaves the position of the industry on January 1, 1904, approximately as follows as to mills completed and technically in operative condition:

	Sheet.		Tin plate.	
	Plants.	Mills.	Plants.	Mills.
Steel Corporation	20	164	22	265
Independent	35	155	16	110
Totals	55	319	38	375

This summary includes the Sharon Tin Plate Company under the Steel Corporation, as a regularly going plant; the Sharon Sheet Steel Company are not included, as they are not completed, and it is not definitely claimed that they ever will be. The corporation tin plate total includes the Monongahela plant as having 14 mills; it has now only eight in operative condition, but the six which have been dismantled are fully represented, as to potential capacity, by the continuous mill now in operation at the plant. It has been the purpose to include among the independent sheet mills only such as are equipped to make 20 gauge and lighter, box annealed, one pass cold rolled. If there were included mills making heavier gauges, as some of the Steel Corporation mills actually do, the independent total would be somewhat larger.

Activity During the Year.

In October, 1902, nearly all the then completed independent tin mills were running full, while the American Tin Plate Company's mills were not turning out half their normal product. On November 3, 1902, the latter made their cut of $8 a ton, and the position began to be rapidly reversed. On January 1, 1903, the majority of the independents were idle, while the leading interest had over half of all their plants in operation, and were constantly starting additional ones. The reversal of conditions in sheets was not so marked, as the cut in sheets had occurred earlier, while at the new price the independent sheet mills had a better chance of running than the tin mills.

So heavy was the demand for tin plate in the summer that in the middle of June the American Tin Plate Company had 239 tin mills running, which included all their plants, except Champion, Beaver, Crescent, and the six mills at Monongahela put to other uses, while the independents had 62 mills running, this representing their entire strength at that time except for one plant which was in financial difficulties and another where the product was not actually tinned, although it was rolled tin plate style. Several independent mills have, of course,

been completed since June. It was supposed at the time that this brought out the entire practicable strength of the American Tin Plate Company, but this was not the case. While it was not considered desirable at that time to operate the Crescent plant, at Cleveland, this plant was started three or four months ago, under nonunion auspices, when other plants which were running in the summer had been shut down.

The Effect of Independent Competition.

On January 1, 1903, a box of 100-pound coke tin plate sold at 90 cents more than 100 pounds of No. 28 gauge one pass box annealed sheets. In March, when tin plate had been officially advanced 20 cents a box, and concessions had been withdrawn on sheets, the spread had increased to $1.05; at the close of the year the spread had increased to $1.30. The industries are similar in many respects, using the same character of steel and labor. The expenses of a sheet mill are the expenses of a tin mill. Of course, the converse of this proposition is not true; a tin mill has certain expenses which a sheet mill has not, but the only one of these in which there is a possibility of explaining this increased spread in selling price of the product is pig tin, and it does not explain it. The average daily closing price of spot tin was: January, 28.30 cents; March, 30.20 cents; December, 27.60 cents. Here is an actual decline of 0.70 cent, equal to 1.50 cents a box of coke plates. Moreover, the highest price in December was only 4.50 cents above the lowest price in January. Clearly pig tin has nothing to do with it.

An inspection of the table summarizing the competitive position of the trade throws considerable light on the subject. In the case of sheets, the independent mills constitute 49 per cent. of the total number of mills; in the case of tin plate the proportion is 29 per cent. This is not all. The independent sheet mills are largely new ones, built on strictly modern lines with fairly ample capital resources. A number of them are allied with finishing plants making sheet products where the value of the material is but slightly advanced by the finishing operation, as in the manufacture of corrugated roofing. Some of these plants make "iron" sheets, for which there is a well defined, however irrational, demand. It may not be scientific to employ on outside work a sheet which is so full of material other than iron that corrosion is resisted, while the tensile strength and workability are impaired; perhaps it would be more scientific to employ a good steel sheet and properly paint it, but the market for a commodity depends on facts and not on theories. These and other factors make the 49 per cent. of independent sheet capacity a very important factor to be reckoned with. The 29 per cent. independent capacity in tin plate, on the other hand, cannot be taken at par from a competitive market standpoint. Our summary includes the National Enameling & Stamping Company with 24 tin mills. They are technically tin mills, operated tin plate style, but the bulk of the product is never tinned at all, while the balance finally reaches the market in such finished form as not to be much of a competitor with tin plate sold in original packages. A few of the other independent tin mills have similar alliances, while others are owned by concerns making high grade roofing plates, the market for which has comparatively little relation with ordinary coke plates, which constitute 80 or 85 per cent. of the total tin and terne plate production. It is admitted, moreover, that more than one of the tin plate independents has never been in financial position to operate satisfactorily. There are only two or three formidable independents making coke tin plate as their principal product. Another factor still is the fact that the leading tin plate interest have a resource of their own in the "rebate" trade by which they can take a certain amount of business, aided by cheap steel and reduced labor, which the independents do not touch.

Thus as a general proposition it can easily be stated that independent competition is three or four times as great in sheets as in tin plates, and this fully explains the constantly increasing market spread between the two commodities to which we have adverted. It is frequently assumed that some explanation lies in the allegation that the demand for tin plate has been better than the demand for sheets. This can hardly be supported by comparison with previous years, and to compare the demand relative to manufacturing capacity is simply reasoning in a circle. One must go outside the circle and weigh the capacity.

Technical Progress.

One striking development raises the year 1903 above all its predecessors since the year in which the industry of making tin plate was permanently established in the United States. A commercial success has been made of a partly automatic method of rolling thin sheets. There have been many proposals with this object in view. Quite a number of them have passed through the Patent Office and been since forgotten. The inventor of a rod mill on which millions of tons of rods have since been rolled had at the time he invented his rod mill, years ago, a plan for the continuous rolling of sheets for tin plate, in which his friends thought he had more confidence than in the rod mill. It went through the Patent Office, and no further. A decade ago Karl Wittgenstein, in Austria, had his continuous mill in operation, but it does not go below about 1-16 inch, and the project has no aspirations to rolling other than singles. It is only mentioned as showing how far previous achievement had been from the desideratum.

During the greater part of the past few months the semicontinuous mill has been in operation at the Monongahela Tin Plate Works, on the South Side, Pittsburgh. Its product has been as high as 75 tons in 24 hours, and much of it has been finished and sold in the market as tin plate, without distinction from the other product of the American Tin Plate Company. The mill was designed throughout by C. W. Bray, chief mechanical engineer of the American Tin Plate Company and of their successors, the American Sheet & Tin Plate Company. Most of the patents covering the invention are still in the office. Some have even been abandoned, and fresh applications made, rather than allow the premature publicity which the issuing of patents would give.

Before the United States Steel Corporation were formed the general plan of the Bray mill had been laid out, and the American Tin Plate Company had made an appropriation for an experimental plant of full commercial proportions. When the Steel Corporation were formed the appropriation was held up with a mass of other appropriations, many of which the consolidation had rendered unnecessary. In the fall of 1901, under the auspices of the Steel Corporation, a new appropriation of $150,000 to $200,000 was made for the purpose of building a plant at the Monongahela works. In *The Iron Age* of November 28, 1901, especial prominence was given to the announcement that the company were about to install an entirely new process for rolling black plate which would eliminate between two-thirds and three-fourths of the present labor at the hot mill, and greatly increase the output. Early in the new year most of the contracts had been let for the apparatus, but the rest of the year was spent in experimenting with individual parts, it being the desire to have each unit perform its own function perfectly before the more complicated operation was attempted of rolling a finished sheet. As there were involved, besides the matter of conveying light bars, pairs and packs through a continuous mill, something never before achieved, the operation of a continuous heating furnace, an automatic matcher and an automatic doubler, it was highly desirable that the pioneer work should be simplified as much as possible.

Early in 1903 the various elements had all performed their individual work more or less satisfactorily, and the next step was to couple them together, which brought out new points where changes would have to be made. The last serious difficulty occurred in the sumer with scaling in the furnace, when Mr. Bray was suddenly called from a vacation in Canada to design a new furnace.

Equipment and Operation.

The equipment is as follows:

1. Continuous heating furnace.
2. Continuous roughing mill of five stands, with tables.
3. Automatic matcher.
4. Continuous mill of two stands, with tables.
5. Automatic doubler.

This equipment accomplishes work which ordinarily requires two heatings, two rollings and a doubling, all done by hand. By the rapidity of the operation the initial heat is sufficient for a reduction which, on the old style, requires two heatings. The continuous roughing mill carries the reduction somewhat farther than is done in the old style on the first heat, leaving less work to do on the pairs. The pack, doubled in four as it leaves the mill, is practically the same as is produced by the ordinary method, and passes on to receive the usual treatment—shearing the end, heating, rolling, doubling and shearing, heating and finishing in a pack of eight.

The mill probably does not represent as great a departure from established practice as would be surmised. It still leaves half the work to be done in the old way. It eliminates over half the actual manual exertion, and, as under the Amalgamated Association scale this strictly hot mill labor is paid for at the rate of $11.85 per ton, for roller, catcher, heater, doubler and screwboy, on No. 30 gauge, this saving alone would be an excellent one, but it really does more. To fully measure its value something other than the technical yardstick must be taken. An incident should make the drift of this statement clear. Some years ago the projectors of a new sheet bar and tin mill plant looked over the ground, and finding that the usual width of tin bar was 6, 7 or 8 inches, with one small mill making 10-inch bars and another making 12-inch bars, conceived the idea of making their bars as wide as the pack, and proportionately thinner, rolling them in the tin mill lengthwise instead of crosswise of the bar, and dispensing with the first heating and roughing involved in the ordinary process. They immediately found themselves confronting the proposition that they would have to pay the same wages per ton at the tin mill, no matter how much manual labor was saved by the condition in which the steel was furnished, and the project was dropped. This religiously adhered to principle has prevented any modest improvements being made in the rolling of sheets or black plate, since there would be the greatest difficulty to the owners of the mill in collecting the benefit. Short steps were useless; a broad jump would have to be made, so that there would be no room for discussion as to whether a new class of work was established. Those who contemplated this feature have realized all along that whenever the old methods of rolling sheets were changed it would not be by a gradual evolution, but by a startling innovation.

Extension of the Process.

Early in the year the American Tin Plate Company succeeded in getting an appropriation from the Steel Corporation, under the heading "imperative," of $1,000,000 for the extension of the Bray process to other plants. In the general announcement of the Steel Corporation's $36,000,000 improvement programme on March 3, 1903, this fact was expressed (or concealed) in the following official language: "American Tin Plate Company; the installation at various of their mills of modern and improved methods of operation, $1,000,000." A much smaller appropriation was made to the American Sheet Steel Company to erect a semiexperimental mill on the same general principle, but designed to roll sheets, at the Vandergrift plant. This was expressed in the same style: "The erection and installation at Vandergrift Works, Vandergrift, Pa., of improved and modern operating methods." These appropriations were made so that the moment the Monongahela plant justified further erection there would be no delay from red tape. The work of installing the process at other tin plate plants of the company is to be prosecuted shortly, and the fact that the tin plate plants are now being run very full may have something to do with this intention. The erection of the mill to roll steel sheets is to be taken up at once.

Minor Technical Advances.

The sheet and tin plates industries have made other advances along technical lines, but comparatively these have been of lesser importance. There has been more study of the heat treatment of the steel, both in the heating furnaces at the hot mills and particularly in the annealing furnaces. It is but a few years ago that annealing was purely a matter of thumb rule. It was in the hands of annealers the majority of whom had no doubt that the number of hours which experience showed the box of sheets or black plates had to remain in the furnace was in some degree the measure of time which steel had to be maintained at certain temperature in order to anneal it. It is surprisingly recent that the idea has percolated to the rank and file, if indeed it has yet, that annealing consists in the establishment and not in the maintenance of a certain temperature.

In pickling there have been continued careful comparisons of acid consumption and methods, whereby, through modifications of the pickling proper and changes in the treatment of steel previous to its pickling, the quantity of acid required has been further reduced, which means a saving in steel as well, since acid is not used unless steel combines with it.

In the tin house there has been some further installation of improved and automatic machinery, particularly of the automatic riser.

Relations with Labor.

The sheet and tin plate industries obtained two important concessions from the Amalgamated Association during the year. In May, when the annual tin plate scale was signed, the workers agreed to an increase in the limit of output of 500 pounds per turn in 31 gauge and heavier, and 300 pounds in gauges 32 and lighter. This was but the second increase since the tin plate scale was formulated many years ago. The first was an increase of 500 pounds all through, which went into effect July 1, 1899, being only conceded at that time because the workers concurrently got a substantial increase in tonnage wages. In the early days it was not often that the turn limit was made, and there was little demand for a greater limit. In the past few years, owing largely to the introduction of heavier mills, with rolls 26 inches in diameter, as against 18 to 22 inches, the common size a decade ago, there has been a strenuous demand for a higher limit. The increased limit on 30 gauge is 6250 pounds per turn of eight hours, but it has been demonstrated over and over again that from 7000 to 8000 pounds can be made under favorable conditions. The present scale does not recognize any such fact; when giving the increase last summer the workmen even succeeded in having eliminated the former provision, which allowed turns to be made up the same week to the extent of 500 pounds excess.

The second concession obtained from the Amalgamated Association was in December, when at the instance of the independent sheet mills a reduction of 10 per cent. was made in the sheet scale wages, effective January 1, 1904, and the limit of output increased by increasing the turn's work from 135 to 150 pairs, and allowing turns to be made up any time in bi-weekly periods. The action was without distinct precedent in the annals of the association, in that it changed the basis during the scale year. The nearest approach to such action was in January, 1895, when after a lockout of nearly four months the workers consented to a reduction, but in that case there was a clear cut dispute as to whether the workers had not, when the scale was signed in the summer, agreed to accept a reduction in case the tin plate duty was reduced, as was contemplated in the Wilson bill, then pending.

That the Amalgamated Association made these concessions in the sheet scale is ample evidence of the seriousness of the situation which confronted the trade. It simply was that the independent sheet mills were mainly union, while the important plants of the American Sheet Steel Company were mainly nonunion, operating always without limit of output, and with a heavy wage reduction just going into effect.

Our table, already presented, shows 164 sheet mills belonging to the leading interest, and 155 mills belonging to independents. Of the leading interest mills 91, or 55 per cent., are nonunion; of 155 mills belonging to independents, 123, or 79 per cent., were union at the time this agitation started, one having become nonunion in their impatience. The comparison does not stop here: the nonunion mills of the leading interest are in general their largest and best mills; the nonunion mills, in the independent list, are mainly Eastern mills. The only

nonunion plant of importance in the Central West was that of the Allegheny Steel & Iron Company. The steel corporation's nonunion mills include such as Vandergrift, Kirkpatrick, Wood and Dover, containing from 10 to 23 mills each. Their only union plant containing more than nine mills is the Ætna-Standard, and the union list contains such plants as Dresden and Dennison, which are hardly likely to be operated under any conditions. It was, therefore, absolutely necessary that organized workers should extend aid to the independent sheet mills and place them on a competitive basis. It was an error of judgment on the part of President Shaffer in precipitating the 1901 strike, which created this condition.

The Amalgamated Association is much stronger in the tin plate department of the Steel Corporation than in the sheet department, while the independent tin mills are even more fully organized than the independent sheet mills. Of the Steel Corporation's 265 tin mills, 188, or 71 per cent., are union, and 77 nonunion, as follows:

Union.

American	28	Middletown	4
Anderson	7	Morewood	8
Cambridge	6	Pennsylvania	6
Champion	6	Pittsburgh	7
Falcon	6	Sharon	20
Greer	20	Shenango	30
Humbert	6		
La Belle	10	Total	188
Laughlin	24		

Nonunion.

Beaver	7	National	24
Chester	7	Star	8
Crescent	6		
Demmler	11	Total	77
Monongahela	14		

At the beginning of the year the only regularly idle plants of the above are Beaver, Cambridge, Champion, Falcon, Humbert, Middletown, Star and the two New Kensington plants, making a total of 56, and leaving 209 mills which, while not all running full, are doing quite well. In fact, the company are running a surprisingly large number of their works.

Among the independent tin mills the only important nonunion interest is the McKeesport Tin Plate Company, who established their status in the summer by refusing to sign the scale on its first presentation after the works began operations.

Canadian Industrial Notes.

Another Bounty Dispute.

TORONTO, January 2, 1904.—A fresh difference has arisen between the Canadian Government and the Dominion Iron & Steel Company about the bounty claims of the latter. According to the Department of Trade and Commerce, which administers the Bounty act, the claims are too large, and some of them are therefore disallowed. In its stand the Department is supported, if it has not been prompted, by the Auditor-General. The main condition prescribed for the bounty on steel ingots is that 50 per cent. of their ingredients must be derived from pig iron made in Canada. It is contended on the part of the Government that this condition has not been fulfilled in every case where it is declared to have been. An element which the Department insists on counting is the iron ore used in the process of converting the molten pig iron into steel. It is contended that, if this is included, the Canadian pig iron content of the steel produced by the Dominion Iron & Steel Company will be found to be less than 50 per cent. On their side, the company hold that the iron ore in question is really not a constituent, being no more than a purifying medium, no more deserving to be reckoned as an element in the steel produced than is the dolomite or limestone that is used for similar purposes. The Government refuses to take that view. It finds that the total weight of pig iron, scrap, ferromanganese, iron ore, &c., placed in the furnace at a heat is in some cases more than twice the weight of the single ingredient pig iron. In such cases it refuses to pay the duty. The company meet this way of testing their claims by alleging that in no country do chemists regard as an ingredient the crude ore used in the steel process.

The company will be likely to take steps to have the matter adjudicated. The objection in this case may be supported by the letter of the law, but it appears no less contrary to the spirit of the Bounty act than was the former attempt to invalidate the company's claim. Of course an official like the Auditor-General is bound to give the country the benefit of the smallest doubt, and can, therefore, be expected to go no farther than a literal construction of the governing legislation will allow.

Another question relating to the bounty law has been brought under the notice of the Government by the steel manufacturers. It concerns the application of an extension that was made to the act last summer. A subsection was at that time added providing for a bounty of $6 a ton on rolled wire rods, not more than ⅝ inch in diameter, manufactured in Canada from ingredients of which not less than 50 per cent. of the weight consists of pig iron made in Canada, and sold to Canadian wire manufacturers for use in making wire in their manufactories. A further provision of the subsection calls for a bounty of $3 a ton on rolled plates and structural forms which are sold for consumption in Canada. The act empowers the Government to make arrangements for the carrying out of these new bounty enactments. Now the Dominion Iron & Steel Company expect to be turning out wire rods in a short time, and they desire to have a clear understanding of the rules by which the Government will be guided in the consideration of claims submitted for bounty payments. What, they ask, are the regulations which will be adopted for checking the company's statements as to the proportions of the constituents in the material used, and especially as to the disposal of the product? It is necessary that the company should know beforehand whether the Government will require impossible proofs or unreasonable guarantees that the wire rod is used exclusively for the manufacture of Canadian wire in Canadian works. Representations on the subject were made to the Auditor-General by J. H. Plummer, president, and F. P. Jones, solicitor, of the Dominion Iron & Steel Company, as well as by William McMaster, manager of the Montreal Rolling Mills.

Iron and Steel Duties.

By the same deputation representations were made to the Finance Minister on the subject of the duties on iron and steel. It was stated that American makers are selling steel billets, steel rails and other rolled steel products in Canada at prices that are from 20 to 25 per cent. less than those asked in the United States. American steel billets are being offered in Canada, it is alleged, at $20 a ton, whereas a year ago Canadian manufacturers were getting from $24 to $26 a ton for pig iron. American steel rails, too, are said to be quoted here at from $4 to $8 less than they can be bought for in the United States. Montreal manufacturers are convinced that there is need for a thorough revision of the iron and steel schedule.

It is estimated that the output of the Dominion Iron & Steel Company's works, in 1903, was about 140,000 tons of steel billets and 130,000 tons of pig iron. At present its average monthly output is about 9000 tons of product.

Rails from Sheffield.

A contract for 6000 tons of 80-pound steel rails has been awarded to Charles Cammell & Co. of Sheffield, England, by the Temiskaming & Northern Ontario Railway Commission. The price, it is admitted, is higher than that at which the contract could have been filled from American sources. A tender was put in by the United States Steel Products Company at a lower rate, but the commission (which is building the road for the Ontario Government) concluded to give the order to the English concern. An explanation which is given out through the medium of the Government's organ, the Toronto *Globe*, is to the effect that the contract was so placed in pursuance of a desire to give Britain a real preference. That explanation does not necessarily account wholly for the choice of the higher price, and may be presumed to be largely political. C. A. C. J.

Iron and Industrial Stocks in 1903.

Industrial stocks passed through a trying ordeal in the year just ended. The decline in values was severe, entailing heavy losses on those who had invested their means in this form of securities. The previous years had been so extraordinarily prosperous for industrial enterprises that a large part of the investing public had overcome its distrust of the uncertainties attending the manufacture of iron and steel, and the belief had become deeply rooted that with the advent of great consolidations a new era had dawned. Men of high standing in the financial world inculcated the doctrine that the day of great fluctuations in prices and consumption had passed, and that the manufacturing industry would be sustained on a firmer basis than that existing before the day of consolidations. The earnings of numerous industrials had been so greatly in excess of dividend requirements on their preferred stock that a wide margin of safety was apparently assured, even if business should suffer seriously from some unexpected influences. But the events of the year proved that natural conditions governing trade had by no means been changed. It was also found that the great financial interests had overestimated the people's capacity for investment, and prices of all securities declined heavily. The decline in the industrials was aggravated by the ill conceived scheme to convert United States Steel preferred stock into bonds through the agency of a syndicate. The course of the market on these stocks was full of interest, as will be shown in the review herewith presented.

January opened with a strong market for industrials. A heavy investment demand for railroad stocks was a special feature, but widespread talk of increased dividends on the common stocks of car equipment companies strengthened all industrials. Liquidation in the common stock of the Philadelphia & Reading Railroad Company chilled the market in the second week, and industrials declined from $1 to $6 per share, Colorado Fuel showing the heaviest loss. The following week Colorado Fuel declined $4 further, while other stocks held fairly firm.

One of the features of February was an announcement that subscriptions of employees to the profit sharing plan of the United States Steel Corporation had totaled 51,125 shares of the preferred stock, which they took at 82½. All industrials were strong throughout the whole of this month, with reports of the United States Steel Corporation absorbing more competitors. A judicial decision was rendered favorable to the scheme proposed by the corporation for converting $200,000,000 of the preferred stock into 5 per cent. bonds through a syndicate contracting at the same time to purchase $50,000,000 additional bonds to provide capital needed for improvements.

The new bonds of the United States Steel Corporation were placed on sale in March. As these bonds were not listed on the New York Stock Exchange for some time, the first sales were made on the curb, opening at 96, from which figure they soon declined quite sharply as a result of stringency in the general money market, which affected all stocks and bonds, some quite low records being made on industrials.

The scarcity of money continued in April, causing declines when loans were called, with sharp recoveries whenever the financial pressure relaxed, but a crushing blow was finally given to those who were endeavoring to sustain the stock market in the judicial decision against the legality of the Northern Securities Company. From that time values almost continuously declined until late in the fall. Rumors of diminishing earnings depressed United States Steel stocks this month and heavy realizing occurred in the common. The new 5 per cent. bonds declined to 83¼. Dissensions among stockholders caused the dividend on Chicago Pneumatic Tool to be passed and that stock fell to 35.

Unfavorable influences dominated the market in May. Confidence was completely unsettled when the fact became known that it had been found necessary to form a syndicate to underwrite the issue of new Pennsylvania Railroad stock. Toward the close of the month heavy liquidation in all stocks set in. A panic in the Montreal stock market forced Dominion common to 13 and the preferred to 40. Reports were circulated of steel works closing for lack of orders. United States Steel common fell to 30⅞, the preferred to 80 and the new 5's to 82⅞.

This period of great liquidation culminated on June 10, when United States Steel common fell to 29 and the preferred to 79¼. The failure of a Montreal house that had been speculating largely in Dominion and Sloss-Sheffield shares caused the former to drop to 12¾ and the latter to 41⅛. Later in the month another torrent of liquidation broke out. Colorado Fuel dropped to 60 under rumors of financial troubles. A receiver for the United States Shipbuilding Company was asked for. United States Steel common declined to 28⅜ and the preferred to 78⅛, making new low records.

July opened with some show of improvement, which was blighted by an application for a receiver for the United States Cast Iron Pipe & Foundry Company. The application was dismissed, as the company was shown to be solvent, but the common stock dropped to 7 and the preferred to 45. Furious liquidation proceeded in other industrials as well as in railroad stocks. July 24 was a day of great excitement, with failures of four brokerage houses. United States Steel common declined this month to 21⅜, the preferred to 68½ and the new 5's to 77⅜.

Talk of a reduced dividend on the common stock caused a further outpouring of United States Steel shares in August. On the 5th the stock market was on the verge of a panic, and two brokerage houses failed, but banking interests came to the relief of the distressed holders of stocks, and another temporary recovery occurred. At this time the troubles of the Consolidated Lake Superior Company became acute, and appeals were made to the stockholders to come to the relief of the corporation by subscribing funds for a reorganization. The directors of the American Can Company declared a dividend of 2½ per cent. to the owners of preferred stock, which was their first dividend declaration, but this did not prevent the stock from declining much lower.

September was a month of almost continuous liquidation. New low records were made almost daily for a large part of the month. Colorado Fuel passed the dividend on the preferred stock. Announcement was made that the bond conversion syndicate of the United States Steel Corporation had been given an extension of time, from October 1 to July 1. Receivers were appointed for the Consolidated Lake Superior Company. United States Steel common fell to 16¼, the preferred to 61¾ and the new 5's to 70⅞.

October opened with some improvement in the situation, but hopes of a permanent recovery were dashed by the revelations regarding industrial promotion in the judicial inquiry instituted by the receiver of the United States Shipbuilding Company. The dividend on United States Steel common was reduced to ½ of 1 per cent. for the quarter. A fresh stream of liquidation started on October 8. It was assisted by reports affecting the Crucible Steel Company of America. Shortly afterward the directors announced that they would probably be obliged to pass the dividend on the preferred stock, to finance the affiliated Clairton Steel Company, which had been under contract of sale to the United States Steel Corporation, but from which the latter had receded. Failures of trust companies at Baltimore and a national bank at Pittsburgh caused general uneasiness in financial circles, and militated against improvement.

A reduction in steel billet prices early in November caused sales of United States Steel stocks on a larger scale than ever. On November 10, low records for the year were made, the common selling at 10, the preferred at 49¾, and the new 5's at 65. Some recovery occurred, and the improved feeling was strengthened on November 19 by an official announcement that the bond conversion scheme had been terminated and the operations of the syndicate would cease. A weight on the market was thus removed. It was felt that there would no longer be an outpouring of bonds and a depression of the preferred stock by those interested in buying it cheap. Some little disturbance was made by heavy sales of Republic stocks, forecasting the passing of the preferred stock

dividend, but the general market was not seriously affected.

December was a month of widespread recuperation, in which stocks generally moved upward, accelerated by heavy purchases to cover short sales of iron and steel stocks made by those who had expected still lower prices.

The following table summarizes the course of prices for the year, giving the closing prices for 1902, the highest and lowest prices in 1903, the closing prices for 1903, and the net decline for the year, it being observed that Allis-Chalmers preferred is the only stock in the list showing an advance:

Stock.	Close, Dec. 31, 1902.	Highest in 1903.	Lowest in 1903.	Close, Dec. 31, 1903.	Net change in year.
Allis-Chalmers, com.	18	23	7	7	11
Allis-Chalmers, pref.	82	87½	82	83	+1
American Can, com.	11	11⅞	2⅛	3¾	7¼
American Can, pref.	51⅛	50¼	27	34¾	16⅜
American Car & Fndry, com.	36	41¾	17¼	20⅜	15⅝
American Car & Fndry, pref.	91½	93	60½	69	22½
American Locomotive, com.	29½	31⅝	10½	18½	11
American Locomotive, pref.	95¾	95¾	67½	76½	19¼
American Steel Fndries, com.	15	20	4½	5	10
American Steel Fndries, pref.	69	69½	38	43½	25½
Cambria Steel.	27½	26¾	18	19½	8
Colorado Fuel, com.	81¼	82½	24	30½	50¾
Colorado Fuel, pref.	130¼	122	65	65	65¼
Crucible Steel, com.	21⅝	21¼	3⅛	4⅝	17
Crucible Steel, pref.	85¾	85¼	28½	31	54¾
International Pump, com.	46½	46½	28	30	16½
International Pump, pref.	88	89½	70	72	16
National Enameling, com.	34½	36	22	30	4½
National Enameling, pref.	90	92	75	80	10
Pressed Steel Car, com.	62⅝	65¾	22½	31	31⅜
Pressed Steel Car, pref.	92½	95	62½	70	22½
Railway Steel Spring, com.	35	37	16	22¾	12¼
Railway Steel Spring, pref.	86¼	90	67	79	7¼
Republic Iron & Steel, com.	20¾	22⅝	5⅝	7½	13¼
Republic Iron & Steel, pref.	77¾	80⅝	36¾	42	35¾
Sloss-Sheffield, com.	59	72	22¼	33	26
Sloss-Sheffield, pref.	90¾	97½	67	79	11¾
Tennessee Coal, com.	60	68⅝	25¾	38½	21½
U. S. Pipe, com.	13	15	6	8½	4½
U. S. Pipe, pref.	50	55	33	40	10
U. S. Steel, com.	36¼	39⅞	10	12⅜	27⅞
U. S. Steel, pref.	85⅞	89¾	49¾	57⅞	28
U. S. Steel, new 5's	..	96	65	71	25

The American Sheet & Tin Plate Company.

A circular issued December 31 states that the business of the American Sheet Steel Company and American Tin Plate Company will hereafter be conducted under the name of American Sheet & Tin Plate Company, with the following organization: George G. McMurtry, chairman of the Board of Directors; W. T. Graham, president; W. M. Leeds, first vice-president; E. W. Pargny, second vice-president and manager of sales; W. P. Beaver, assistant to president; John Warner, assistant to first vice-president; Howard M. Davis, assistant manager of sales; H. B. Wheeler, secretary and treasurer; H. L. Austin, auditor; G. M. McGinnis, assistant auditor; C. W. Bray, chief engineer; R. A. McKinney, purchasing agent.

The general offices of the company will be moved from Battery Park Building, New York, to Pittsburgh early in 1904; but until further notice officers as above can be addressed at New York, with the exception of Mr. Bray and Mr. McKinney.

The following district sales agents have been appointed: Frank Dickerson, Battery Park Building, New York; W. H. Eaton, Marquette Building, Chicago, Ill.; W. J. Wetstein, St. Louis, Mo.; I. B. Williams, San Francisco, Cal.; Richard R. Hoge, Portland, Ore.; E. W. Sparhawk, Denver, Col.; J. R. Scott, New Orleans, La.; W. T. Shannon, Cincinnati, Ohio. The Detroit sales office has been discontinued. The Pittsburgh sales office will be merged with the general sales office when the offices are moved.

The Worcester works of the American Steel & Wire Company are now employing some 5000 men, as compared to the 6200 who are on the pay roll when the works are rushed to their limit of production. Business is on the gain, however, and the officers of the department look to see a first rate spring's business.

Iron and Steel Imports and Exports.

The value of the iron and steel imports, excluding iron ore, in November, according to the report of the Bureau of Statistics, just issued, was less than half of the value of similar imports in the corresponding month of 1903. The figures are $2,309,233 and $4,779,093 respectively. For the 11 months ending with November the values are $39,513,847 for 1903 and $36,766,961 for 1902. Taking the commodities for which quantities are given, the tonnage for November shows but a slight reduction on the figures for October. The November figures are 45,567 gross tons and the October figures 48,399 gross fons. The continued importation of such commodities as pig iron, rails, billets, tin plates and wire rods may be ascribed partly to the requirements for the Pacific Coast, which our manufacturers had hardly begun to fill at that time. Included in the pig iron figures also are ferromanganese and other iron alloys. The quantity table for the month and 11 months is as follows:

Imports of Iron and Steel.

	November.		Eleven months.	
	1903.	1902.	1903.	1902.
Commodities.	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	18,765	100,400	584,855	507,010
Scrap	2,457	10,502	79,846	97,361
Bar iron	2,452	2,479	39,328	25,995
Rails	3,395	8,107	93,777	57,495
Hoop, band and scroll	32	38	1,314	3,433
Billets, slabs, bars, &c., steel in forms n.e.s.	6,580	41,077	260,116	262,789
Sheets and plates	3,051	970	11,263	6,103
Tin plates and terne plates	4,711	4,087	44,860	53,675
Wire rods	1,977	1,915	19,012	18,607
Wire and articles made from	386	371	4,539	3,172
Structural iron and steel*	1,722	....	3,119	33
Chains	34	27	374	547
Anvils	14	5	185	82
Totals	45,576	169,978	1,142,588	1,036,302

* Included in "All other" prior to July 1, 1903.

The exports of iron and steel, excluding ore, in November, were valued at $7,988,415, as compared with $8,119,274 in the corresponding month of 1902. The values for the 11 months ending November were $89,685,201 for 1903 and $90,136,024 for 1902. The exports of commodities for which quantities are given showed a gain of 8100 tons, as compared with the corresponding month of 1902, but a reduction of 3100 tons as compared with October. The increase in sales of iron and steel for export had not made itself felt in November, but will probably be seen in the December or January figures. The quantity table for the month and the 11 months is as follows:

Exports of Iron and Steel.

	November.		Eleven months.	
	1903.	1902.	1903.	1902.
Commodities.	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	1,777	1,703	24,871	26,277
Scrap	898	858	5,289	9,040
Bar iron	2,083	239	19,020	19,187
Wire rods	818	2,953	21,375	21,201
Steel bars	578	450	15,081	8,709
Billets, ingots, blooms	296	220	1,380	2,409
Hoop, band, scroll	320	76	1,942	1,547
Iron rails	4	....	502	210
Steel rails	5,140	1,588	22,780	66,404
Iron sheets and plates	131	118	4,633	3,256
Steel sheets and plates	1,611	1,681	11,744	13,988
Tin plates and terne plates	33	103	203	1,531
Structural iron and steel	2,614	1,993	27,707	51,776
Wire	10,355	7,503	98,613	91,584
Cut nails	473	621	8,195	6,775
Wire nails	3,102	1,799	28,742	24,140
All other, including tacks	129	356	2,064	1,896
Totals	30,362	22,261	294,141	349,930

The special board of engineer officers having the matter in charge have decided to recommend to the Navy Department a steam turbine installation for two scout ships of about 3000 tons each.

Chicago Iron and Steel Trade in 1903.

BY R. R. SHUMAN, CHICAGO.

A review of the year 1903 is a record of constantly falling prices in nearly everything but labor. It was a year of triumph to the procrastinating buyer, and one of hardship to the man who contracted for his supplies in the early months.

In the light of the depression of the last few months we are apt to think of 1904 as a year of lessened business, but reports from a great variety of sources indicate that it will surpass in the aggregate tonnage any previous 12 months. Values have declined, but it was only the bursting of a bubble that was better pricked. This squeezing out of water is illustrated by the present quoted prices of listed securities as compared with those of eight months ago. It is also illustrated by the fall in price of raw and finished iron and steel products of nearly every class, as noted in the following table:

High, Low and Present Prices of Iron and Steel in Chicago Market.

Commodity.	Highest.	Lowest.	Decrease.	Present price.
Lake Superior charcoal iron.	*$26.50	$16.50	$10.00	$16.50
Northern No. 2 iron.....	*23.50	14.25	9.25	14.50
Ohio strong softeners, No. 1.	*27.50	16.30	11.20	16.80
Common bar iron.....	1.86½	1.30	.56½	1.35
Soft steel bars.....	1.76½	1.46½	.30	1.46½
Smooth finished machinery steel	2.01½	1.71½	.30	1.71½
Open hearth spring steel....	2.66½	2.00	.66½	2.00
Steel billets.....	*35.00	23.00	12.00	24.00
27 gauge sheet steel.....	2.86½	2.41½	.45	2.41½
Old iron rails.....	*24.50	13.00	11.50	13.00
No. 1 R. R. wrought.....	*20.50	10.00	10.50	10.00
No. 1 busheling and scrap...	*14.00	7.50	6.50	7.50
Melting scrap.....	*18.50	9.00	9.50	9.00
Heavy cast scrap.....	*18.50	9.50	9.00	9.50
Wire nails.....	2.15	2.00	.15	2.00
Cut nails.....	2.36½	2.11½	.25	2.11½

* Prices per ton—other prices per 100 pounds.

Confidence and Speculation in the Early Months.

In the early months of the year the inflated conditions of 1902 continued, often in aggravated form, with only here and there a note of warning. In our issue of February 12 we quoted James J. Hill, the railroad magnate, as follows:

"We are coming to a grave industrial reverse. It is hard to tell when it will come, but it is approaching. It may come the present year. A few years may see the closing of many factories and throwing out of work of hundreds of thousands of men. We have been reaping a harvest, and a reverse is coming. We must lower our cost of production. We are losing ground in a manufacturing way. The present high cost of production is due to labor unionism and continued strife. We cannot meet German competition and pay prices that the unions compel."

This note of warning was dismissed as the vaporings of a dyspeptic old man. Farmer Benner's prophecy that 1903 would see a wholesale decline in value was considered the sensational utterance of a crank. And there were reasons to discount all talk of panic or depression. Mills were crowded day and night, and at that could not nearly keep pace with the demand. Railroads, with the greatly increased rolling stock and trackage recently put into commission, could scarcely make an impression on the mountains of freight clamoring for shipment. Pig iron furnaces, steel mills, foundries, and all interests involved in the manufacture and use of iron and steel were pushed to the utmost of their producing ability, and could not begin to take care of their orders.

Improvements and New Plants.

The United States Steel Corporation, in order to take care of this phenomenally increasing business, announced a budget of expenditure March 3 in which $36,000,000 were devoted to the construction of new mills and enlargement of old ones. Of this sum $8,000,000 were expended in the mills at South Chicago and Joliet, and several millions in the plants of the American Steel & Wire Company in Illinois and Indiana. Particulars were given in our issue of June 25. About this time the Inland Steel Company increased their capital stock to $2,500,000, in order to secure a supply of ore and to erect blast furnaces. The International Harvester Company completed their steel plant at South Deering, Chicago, early in the year, and had their bar mill in operation in July. The Youngstown Iron Sheet & Tube Company started their new plant early in July. Late in December the new plant of the Fort Wayne (Ind.) Iron & Steel Company started to roll bars. This property, allied to the American Rolling Mill Corporation, took the place of the mill of that company at Muskegon, Mich., which was dismantled. The National Rolling Mill Corporation during the year completed a bar mill at Vincennes, Ind., to take the place of a smaller one which they removed from Hartford City, Ind. The Grand Crossing Tack Company early in the year put in operation a new steel works south of Chicago, following plans of the Morgan Engineering Company, that has the novel feature of being able to roll a billet 400 feet long. Minor plants and improvements are noted in another column.

Heavy Buying in the First Quarter.

Railroads in the early months placed large orders for cars, the C., B. & Q. alone ordering 2000 steel gondola cars. Not until April did the pace slacken, and then it was labor unrest that brought it about. Even then business was so good that many employers surrendered to unreasonable demands, almost abandoning control of their plants to the unions, rather than miss the harvest of orders that was then rolling in.

Influence of Wall Street.

The calamities in Wall Street in June threw another wet blanket on the feverish business world, and this, followed by the exposure of questionable stock jobbing methods, led to a wholesale decline in securities of every class, good and bad, the majority of them falling below the actual cost of plants and equipments.

Hand to Mouth Buying.

In the early months there was little complaint against the high prices of products then ruling, the urgent cry being for delivery at whatever premium producers sought to charge for quick shipment. This was all changed in the last half of the year, when buyers persistently held off, supplying only their immediate needs, and those at lower and lower prices.

Pig Iron and Billets.

In pig iron there was a gradual surrender of producers to consumers. We had the struggle and final collapse of the Southern Association, the persistent and partially successful efforts to check consumption, the steady decline of prices to a point below cost of production, and the gradual, but healthy, recovery in the closing weeks of the year. Pig iron is watched by users of iron and steel as the barometer of prices on finished products, but a study of the billet market in its relation both with pig iron and with finished shapes will lead the careful observer to conclude that the price of finished steel is to-day more dependent upon the price of billets than the billet is upon pig iron. The decline of steel billets from the early months, when users were paying $35 to $38, to the present price of $24, was first brought about by the heavy importation of German billets, and later by the deliberate actions of the powerful billet pool. The act

of that association in December of squarely fixing the price of billets at $24, Chicago, for 1904, coupled with the coincident reaffirmation of prices on plates, bars and structurals, did a good deal to check the downward course of the markets.

In this connection the whole business world has to thank the not too popular United States Steel Corporation for their consistent adherence to a policy for the last two years that has steadied the steel market and probably prevented a recurrence of the eras of overproduction and panic that were once periodic. By resolutely holding prices down when buyers were bent upon forcing them up, and by exerting their whole power in an effort to hold prices up when pressed on every hand for reductions, this company have, to a great extent, prevented the construction of wild cat mills during boom periods, and the consequent collapse and calamity when the boom passed.

To Check Labor Abuses.

In February the outrageous conduct of the striking teamsters in Chicago had brought about a crisis, and the Chicago Employers' Association was formed to check the abuses of labor. Similar associations were formed in every leading center, followed by State and National bodies of employers, whose sole purpose is was to prevent the anarchistic tendencies of labor leaders from destroying the whole fabric of our industries. Of these associations the Industrial Association of America, the National Manufacturers' Association and the National Building Trades Employers' Association, together with the local Citizens' Alliances and other organizations of employers throughout the country, bid fair to check the abuses of union leaders, and in the long run to benefit the individual workman quite as much as they do the employer himself.

Confidence Restored in December.

The show of a solid front on the part of the employing world is having a salutary influence on the labor element, and permitting mills to run at somewhat lower wage scales which would have otherwise closed their doors altogether.

Outlook for 1904.

Chicago, surrounded as it is by agricultural, mineral and industrial wealth, need fear no serious panic in 1904. Whatever the outcome of the present disturbing elements, 20,000,000 people will continue to look to this center for the bulk of their supplies.

Prices of pig iron, billets and finished products have already started on the up-grade. Southern iron is to-day practically $1 per ton higher than its lowest point a month ago. Finished products, with the possible exception of sheets, have been established on a basis from which the movement, if any, is likely to be upward rather than downward. Buyers have already begun to anticipate their wants, and a healthy buying campaign has begun. While the users of iron and steel throughout the West will, in all probability, buy less than they did last year, they will buy on a basis more consistent with the established selling price of their products. And while they may employ less hands at a somewhat lower wage than last year, the hope is that the usual labor disturbances may be averted, giving the men an opportunity of working steadily at their tasks and leaving them richer at the year's end than they were in a year of intermittent work at high wages and strikes at no wages.

Pig Iron.

The pig iron market for 1903 shows how difficult it is for manufacturers, either singly or associated, to run counter to the inexorable law of supply and demand. In 1902 producers of pig iron in the South used their utmost endeavors to hold the prices down to the neighborhood of $12.50, Birmingham, for No. 2, and in spite of these efforts the market advanced step by step to the neighborhood of $20. Then, in turn, these same interests fought valiantly throughout the year 1903 to prevent prices from going down, with just as little success. January 1 Southern pig iron was selling at $19, Birmingham, or, with a $4.15 freight rate, $23.15, Chicago; 11 months later it was selling at $9, Birmingham, or, with a $3.85 freight rate, $12.85, Chicago, a drop of just $10 per ton; more than cutting in two the price of iron at the furnaces. Lake Superior charcoal iron during the same period dropped from $25, Chicago, to $16.50; Northern No. 2 foundry iron from $23 to $14.50, and Ohio strong softeners from $27.50 to $16.80. The accompanying tables showing average prices and dates of fluctuations illustrate this recession in prices graphically:

Showing Dates on Which Changes Were Made in Prices of Pig Iron During 1903.

Month.		Lake Superior charcoal.	Northern foundry, No. 2.	Ohio strong softeners, No. 1.	Southern foundry, No. 2.
January	1	$25.00	$23.00	$27.50	$23.15
	8	....	23.50	26.30	23.35
	22	26.50	23.00	....	22.85
	29	....	22.50	....	22.35
February	5	....	23.00	....	22.85
March	12	....	....	....	22.35
	26	....	22.50	....	....
April	2	26.00	....	25.80	21.85
	9	25.50	....	....	....
	16	25.00	22.00	....	21.35
	23	....	22.80	....	20.85
May	7	24.50	21.50	23.30	....
	14	24.00	20.00	22.50	19.85
June	11	....	19.50	21.00	19.35
	25	....	19.00	....	19.85
July	9	22.00	18.00	20.00	17.35
	23	21.50	17.25	19.00	16.85
August	13	21.00	....	....	16.60
	20	....	16.50	18.00	15.85
	27	19.00	....	....	....
September	10	....	16.00	....	16.10
	17	....	....	17.50	....
	24	....	15.75	....	15.35
October	8	....	15.00	....	14.85
	15	17.50	....	....	14.60
	22	....	15.50	17.00	14.35
	29	....	....	17.30	14.10
November	5	....	....	17.00	13.35
	12	17.00	14.50	16.80	....
	19	....	....	....	13.10
December	3	16.50	....	....	....
	10	....	14.25	....	....
	17	....	14.50	16.30	13.35
	24	....	....	16.80	....
	31	16.75	....	....	....

As a matter of fact, this decline was not continuous through the year, but was made in a series of rapid drops in the months of May, June, July, August, September, October, November and December. It is almost pathetic to read through the early issues of *The Iron Age* in 1903 and note the tone of confidence displayed by buyer and seller alike. Many million tons of iron were bought by melters early in the year at prices from $8.50 to $10 per ton above the present market, and this iron is not all used. It represents at once an asset and a liability on the part of the men who are unfortunate enough to have bought in excess of their immediate requirements.

In this article considerable attention is given to Southern iron, in spite of the fact that the entire product of the Southern furnaces represents only a fraction of the 18,000,000 tons produced during the year. This prominence to Southern iron is given because it was its weakness which dragged down all other irons, notwithstanding it was in the South that the greatest efforts were put forth to prevent the very thing that happened.

With the opening of January the railroads carrying iron from the South added 20 cents to their freight rates from Ohio River points, making the freight rate to Chicago $4.35. January saw the reduction of $1 per ton in Southern iron for future delivery, though iron shipment was strong, owing to the great scarcity of coke, which compelled the banking of furnaces all over the country, making the January output of all furnaces in the country about 65,000 tons less than the previous months in spite of the increased demand. The impossibility of securing an adequate number of cars and locomotives to handle both coke and iron was also an element in the strained conditions that existed in the early months of 1903. Melters were crying for iron and offering premium prices for quick shipment, and furnacemen bewailed the fact that the coke and car shortage made it impossible for them to supply iron at a time when the profits were greater than they had been for years. This shortage of coke and of cars led to a strengthening in prices all along the line in February, during which month Lake Superior charcoal was quoted $1.50 higher than in January, and while Northern No. 2 made no material change in quotation for future delivery, spot iron could not be secured for less than $24 on track, Chicago, and Southern No. 2 advanced 50 cents above the latest quotation in January. The February production showed a decrease of nearly 88,000 tons over January, or 153,000 tons less than December. It was in February that the coke shortage reached its most acute stage.

In March the supply of coke became more liberal, production of iron was greatly increased, and by the last days of the month the tone of the market was easier and consumers were able to get iron with fair prompt-

ness. In this month the nonassociation furnaces in the South began making a price for Southern iron of $17 at the furnace for the last half of the year, as against $17.50, the association price. The current production was 1,626,208 tons, or the greatest production of any month in the history of the trade up to that time.

In April the tone of the market weakened slightly. Lake Superior charcoal dropped from $26.50 to $25 on large contracts, Ohio strong softeners from $26.30 to $25.80, and the Southern Association reduced its price on No. 2 at Birmingham for the second half of the year to $17.50, which is equivalent to $21.85, Chicago. Nonassociation furnaces in the South, following their usual course, cut this price 50 cents to $1 per ton on desirable orders.

April production was 20,000 tons greater than the record breaking output of the month previous, and in May it began to be evident that production was catching up rapidly with consumption. The price accordingly fell in all lines, Lake Superior charcoal dropping $1, Northern foundry $2, Ohio strong softeners $3.30 and Southern No. 2, $2. The production in May of 1,755,966 tons broke all records, before or since, as the greatest standing output of any month in the history of the country. This is 185,000 tons greater than the largest month of 1902.

Large Importations of Ore and Pig Iron.

By referring to the accompanying table it will be seen that stocks at the furnaces increased gradually through the year, though even at the opening of the second half the stocks at the furnaces were smaller than they should be. It will be seen, therefore, that the first half of the year was one of a high average of prices, owing to the unprecedented demand for iron on the part of melters, large and small, and to the inadequacy of the supply due to the famine in coke. When coke was obtainable the price was exorbitant. The high price of pig iron ruling through the first half of the year enabled European producers to sell in this country upward of 1,000,000 tons of pig iron.

Deadlock Between Buyers and Sellers.

In January and February we saw buyers eager to cover their requirements for the second and third quarters of the year at the high prices then ruling, and very large tonnages of iron were contracted for during that season of feverishness. But in March there began to develop what is often spoke of as a deadlock between buyers and sellers, buyers as if by some preconcerted plan adopting the policy of covering only their immediate needs and refusing to contract far ahead. The wisdom of this move on the part of the buyer was demonstrated by the course of events, although the history of the previous year showed that the opposite policy had paid at that time. This deadlock was particularly notable in foundry irons, and buyers were encouraged to continue it by the action of non-association furnaces, who promptly discounted each successive reduction in price made by the association itself. In March, when the price of Southern iron was strong at $18.50 for the third and fourth quarters, some of the largest buyers in Chicago and the West made firm offers, aggregating thousands of tons, at $17.50 and were refused, but their refusal to buy at the high prices quoted led to the activity just spoken of on the part of the independent furnaces. A large steel company, with mills in Chicago, offered to buy 40,000 tons of basic iron at $17, Birmingham, for the second half of the year, but was refused. Just at that time the producers seemed to have the whip hand, and in one week in March there were 25,000 to 30,000 tons bought in from 1000 to 6000 ton lots of various grades of iron at or near the association price. Late in March several large Northern furnaces which had been banked down for lack of coke secured a sufficient amount of that material to enable them to start up, though they had but little iron available for prompt delivery for a month or more after starting, as they were kept more than busy in supplying their contract customers. About this time a large Detroit stove foundry bought 6000 tons of foreign pig iron. The activity of the importing interests alarmed the American producers and toward the end of March the Southern Association made a differential of $1 per ton in favor of Eastern shipment for the purpose of shutting out the importation of German and Scotch iron. While this had the desired effect of greatly curtailing importation, it was followed by a determined onslaught of Western buyers to secure the same price. The Western melters concluded that if furnaces could profitably sell iron at $16.50 for Eastern delivery they should sell iron for Western shipment at the same price or not at all; and in the end they carried their point. This move was the beginning of the end of the power of the Southern Association and from that time on they carried on a ridiculous stern chase of the market, lowering their prices time after time to meet the existing market, each time losing the business by a prompt cut on the part of the independents. The rulers of the association proved themselves past masters in the art of selling iron.

Toward the latter end of the first half of the year new features began to develop in the business. Reselling became a factor that had to be reckoned with, buyers who had overpurchased taking whatever loss was necessary to prevent a great loss. Another feature was the juggling of grades, buyers securing No. 2 at No. 3 price by purchasing on the basis of analysis instead of frac ture. A number of Southern shippers who were members of the association sought to save themselves from a total loss of their business by selling at the authorized association price and making concessions through the method of guaranteeing that freight would not exceed some nominal figure, 50 cents to $1 per ton. Late in May the United States Steel Corporation bought 50,000 tons of Bessemer iron at $18.50 at the furnace for delivery in the third quarter. The new Toledo Furnace went into blast June 1, further increasing the supply of Northern irons.

Weakness Develops in the Second Half.

The downward tendency of Southern irons at the beginning of the second half of the year was somewhat modified by the strike of the Alabama coal miners and by the knowledge that the stock of both coal and iron at the furnaces was extremely meager, but it was not of sufficient moment to put a permanent stop to the slump in prices. Lake Superior charcoal declined from $24 the previous month to $22, and then $21.50, in July; No. 2 Northern fell from $19 in June to $18, and then to $17.25; Ohio strong softeners, which were $21 in June, were reduced to $20 the first week in July and $19 the third week; No. 2 Southern, whose lowest point had been $18.85 in June, fell to $17.35 the first week in July and $16.85 the third week.

About this time the International Harvester Company offered to buy 40,000 tons of Southern iron at from $13 to $14 for No. 2 at the furnace. This offer was made at the time when the association price was $15, but when independents were quoting $14 to $14.50 for the last half of the year. Fortunately for the harvester company their offer is not thought to have been accepted by any Southern furnace at that time. About the middle of July a large pipe works in Ohio bought 11,000 tons, the Southern portion of which was purchased at the basis of $13.50, Birmingham, for No. 2. On July 10 the Southern Association met in Chicago and named the price of $13.50 for the fourth quarter of the year, or $17.85, Chicago. At this meeting one Tennessee producer withdrew from the association, and offers of iron at $12.50 and $13 quickly followed by furnaces not in the association. Interest in Southern iron became more and more marked on the part of the buying public, and Northern iron suffered greatly. In the last week in July the International Harvester Company again opened negotiations for large tonnages of iron, and they are thought to have bought about 60,000 tons, three-fourths Northern and one-fourth Southern, at about $12 for Southern iron at the furnace, or $16.35, Chicago, and $17 for No. 2 Northern. This price for Southern was $1.50 a ton less than the then "official" association price. The National Malleable Iron Works are thought to have bought 50,000 tons of iron on the basis of $17.50, Chicago, for Malleable Bessemer, this purchase being on a three months' contract. The McCormick division of the International Harvester Company about this time sent out inquiries for prices on 5000 tons of malleable castings, and this quickened interest in the Northern irons among local smelters.

Heavy Midsummer Buying.

The heaviest buying of the year took place in July and August, but, as the furnaces were then running full blast, stocks at the furnaces slightly increased. In the middle of August the Southern Association made another change in its prices, reducing to $12, Birmingham, for the last quarter of the year, a price that was already being quoted very generally in the trade, and even discounted 25 to 50 cents a ton by independent furnaces. During that week fully 50,000 tons of Northern and Southern iron were sold in the Chicago market. This buying, however, was on the part of the large interests, the foundry trade still adhering to their policy of supplying their current needs from hand to mouth. In July there were six furnaces less in blast than the previous month, due to the curtailment of coal supply in the South in consequence of the strike of the miners, and this brought about a decrease in the total production of the country, amounting to about 126,000 tons.

The August production, following the settlement of the miners strike, showed an increase of about 24,000 tons above that of July, though there were fewer furnaces in blast. The month of August showed further reduc-

tions in all pig iron prices, Lake Superior charcoal dropping to $19; Northern No. 2 to $16.50; Ohio strong softeners to $18, and Southern No. 2 to $15.85.

Early in September the No. 2 Calumet Furnace at South Chicago was put in blast for the first time. September, normally an active month, was marked by a very slow buying movement, the microbe of distrust having seized hold of the business world in general for a variety of causes, most prominent of which was the rapid decline in securities on Wall Street, and a talk of panic, which began to be heard on every hand. The practice of buying iron by analysis increased, as the buyer knew it gave the seller an opportunity of shading prices that he had agreed to maintain. Lake Superior charcoal remained steady at the price of the month previous; Ohio strong softeners dropped 75 cents per ton; Northern fell 50 cents, and Southern iron, after showing a flurry of strength after the middle of the month, again declined, until it reached the basis of $11 at the furnace, or $15.35, Chicago, which was 50 cents per ton less than any time of the previous month. At this time the cry of overproduction was heard on every hand, and prominent interests, notably in Eastern Pennsylvania, New Jersey and Ohio, began formulating steps for curtailing production of pig iron. Association meetings were held and agreements were entered into by which a certain percentage of stacks should be banked or thrown out of blast altogether. That the owners of these properties were slow to take this unpleasant medicine, each producer having reasons for prescribing it to his neighbor, is illustrated by the small falling off in September production compared with August, and the fact that the same number of furnaces were in blast in the two months.

By October the Ohio and Pennsylvania furnace proprietors began to see that heroic measures were necessary, and 19 furnaces were thrown out of blast, reducing the production about 34,000 tons. Producers of Northern iron, however, soon discovered that not only was the supply too great, but the price too high, as compared with Southern iron, as buyers were buying larger and larger quantities of Southern iron and less of Northern, some melters discovering that they could dispense with the Northern altogether. It was easy enough to cut prices when iron was $23, Chicago, but when it was necessary to deliver to the consumer's tracks at $16.50 iron that was made with coke bought on contracts signed during the days of coke famine and turned out by labor that had taken one advantage after another of the furnaces in the way of more and more pay and less and less work, the problem became a serious one. Nevertheless, the cuts were made as above indicated. The Southern Association, the last week in September, made their price $11, Birmingham, for Eastern shipment, and $11.50, Birmingham, for Western delivery, which would make the price $15.85, Chicago, but Western buyers hammered at the market so persistently that the arbitrary difference between the Eastern and Western delivery soon disappeared, and association members themselves were selling iron at $15.35, Chicago, not a fortnight after the meeting adjourned.

By the first of October there were prophets who predicted that No. 2 foundry iron would be sold at Birmingham for $9 before the close of the year. A thousand reasons were given why this was impossible, prominent among which were the greatly enhanced cost of labor and the greater difficulty of securing ore, coke and limestone, as compared with 1897, when pig iron was sold at Birmingham as low as $6.50. The trend of events showed that the prophecy was correct, as the impossible came to pass not many weeks later. Early in October the Southern Association held a stormy meeting, in which some of its members were forced to acknowledge that they had sold iron to Western consumers at the arbitrary Eastern rate. During the first week of the month it was estimated that 20,000 tons of Southern iron were sold in the Chicago market on the basis of $10.75, Birmingham, either by independent furnaces or by association proprietors who did not live up to their agreements. Lake Superior charcoal, which had held at $19 since the middle of August, was dropped to $17.50 the middle of October, owing to the rapidly increasing stocks at the furnaces and the comparatively small demand for their product. Northern No. 2 iron was reduced to $15 in an endavor to win back some of the trade Northern producers were losing to Southern furnaces. On October 10 the Southern railroads made effective a reduction in freight, amounting to 50 cents per ton, which reduced the rate from Birmingham to Chicago on pig iron to $3.85 per gross ton. This meant $14.85 instead of $15.35 for $11 pig iron at Chicago. At the same time the East-and-West roads made a reduction of 20 cents per ton in freight from the Valleys to Chicago, and 50 cents from Virginia furnaces. These reductions in freight stimulated buying for a time, and large sales of basic iron were made to local mills, both from Virginia and Alabama furnaces. The middle of October the Southern Pig Iron Association, which had robbed its loyal members of the sale of thousands of tons of iron by attempting to maintain prices higher than the actual market, went to pieces completely. Following this event pig iron at Birmingham declined in successive weeks from $11 to $10.75, and then to $10.25, Birmingham, for No. 2. From this time on it was a fight to the finish, the favorably equipped furnaces gradually forcing the less advantageously situated plants out of blast. While in the North furnace operators were meeting on a friendly basis and agreeing to curtail production, the Southern producers accomplished the same results more effectively by offering iron at a price that represented a loss of $1 to $3 per ton to the furnaces not owning and controlling their own raw materials.

Hundreds of buyers of foundry iron throughout the country had set their market at $10, Birmingham, and declined to place orders for Southern foundry until it should reach that figure. By the end of October $10.25 was being freely quoted, and there was an attempt made on the part of Southern furnaces to make a stand at that figure, but without avail, for our minimum quotation of November 5 is on the basis of $9.50, Birmingham, or $13.35, Chicago. At this price only a few furnaces would sell iron for forward delivery, as it represented a loss to most of them. Many furnaces that had stocks larger than they wished sold from their piles at that price for immediate shipment, and a buying movement of great activity set in. All through the month of November shipments from Southern furnaces taxed the utmost capacity of the carrying roads. By the middle of the month, notwithstanding the determined stand of the majority of the furnaces, the price was hammered down to $9.25, Birminham, or $13.10, Chicago, and many sales were made on the basis of $9, the lowest figure for the year.

Importing to Exporting Basis in Six Months.

It is a startling commentary on the swiftly declining prices that, whereas, in the early months of the year, European producers could pay the freight and duty and deliver the iron in this country at a lower price than our own furnaces would sell it, on December 1, not six months after importation stopped, Alabama furnaces were beginning to export iron to the same countries which had sent their iron here. One order of about 6000 tons was shipped about December 1, and some other orders followed. This exporting of iron did more to stop the decline in price than anything else, as it gave the producers a new outlet that made them independent of the American melter. About December 1 several of the large Southern furnaces announced to their trade that they had no more iron for sale, and refused to sell for forward delivery at the prices then current. Southern iron from the low point of $9 gradually advanced through December to $9.25 and $9.50, with a majority of the furnaces refusing to sell at less than $10, Birmingham, for No. 2 grade. During November Lake Superior charcoal iron dropped another 50 cents, selling at $17, Chicago; No. 2 Northern foundry iron producers cut off $1 in the hope of competing with Southern iron; Ohio strong softeners fell 50 cents below the last week of October.

December was a month of recuperation in pig iron, the strengthening tone of the Southern grades helping all the Northern grades except Lake Superior charcoal, which suffered another cut of 50 cents. Where a good deal of Northern iron had been sold on the basis of $14 for No. 2 during the last weeks of November and the first week in December, the close of the year found local producers unwilling to shade the $14.50 price, even to the largest buyers.

The Year's Production and Consumption.

With stories of enforced and voluntary closing down of scores of furnaces fresh in our minds, and the sentiment still ringing in our ears that foundrymen are not buying iron because they have no orders that call for it, we are apt to conclude that the year 1903 was one of lessened production and consumption in pig iron. The contrary is true. When it was announced at the close of 1902 that all the pig iron furnaces in the United States had produced over 17,700,000 tons of iron and that this iron had been sold and melted, men versed in iron matters believed that a record had been made that would stand for some time. Nevertheless, early in 1903 Archer Brown, one of the greatest authorities in the trade, prophesied that 19,000,000 tons would be produced in 1903. About the close of the second half of 1903 this prophecy was swelled to 20,000,000 tons by many well informed factors in the market. If we estimate the production of December at 1,000,000 tons, it will be seen that the entire production for the year is something over 18,000,000 tons. The coke scarcity in the early months of the year so crippled furnaces that American melters imported more than 1,000,000 tons of pig iron.

This 1,000,000 tons, therefore, should be added to the normal production and consumption of the trade for 1903, making over 19,000,000 tons, which is doing pretty well for a "hard times" year.

Average Prices of Pig Iron, 1903,

On track, Chicago, in car lots.

Months.	Northern coke, No. 2.	Lake Superior charcoal.	Ohio strong softener, No. 1.	Southern coke, No. 2.
January	$23.10	$25.60	$26.54	$23.01
February	23.00	26.50	26.30	22.85
March	22.87½	26.50	26.30	22.47½
April	22.52	25.30	25.80	21.25
May	20.37½	24.12½	22.70	20.10
June	19.50	24.00	21.37½	19.35
July	17.90	22.20	19.80	17.45
August	16.87½	20.62½	18.50	16.28¾
September	16.06¼	19.00	17.75	15.85
October	15.35	18.10	17.36	14.65
November	14.62½	17.12½	16.83¾	13.22½
December	14.45	16.50	16.70	13.25
Average for year	$18.88½	$22.13¼	$21.33	$18.31¼
Average for 1902	$20.50	$23.50	$23.30	$20.10
Average for 1901	15.00	17.50	16.50	14.60
Average for 1900	19.12½	22.00	20.75	18.35
Average for 1899	17.65	19.80	19.67	17.75
Average for 1898	11.00	11.60	12.00	10.45
Average for 1897	10.60	13.00	12.25	10.25
Average for 1896	11.70	13.62½	14.50	11.40
Average for 1895	11.80	13.75	14.25	11.75
Average for 1894	10.60	14.75	13.50	10.75
Average for 1893	12.80	16.12½	16.00	12.75

Bar Iron.

Buyers of bar iron in 1903 were at sea most of the time, particularly in the first half of the year, when the price would advance and decline and advance again almost without reference to conditions in other lines. In the last half it was easier for the bar iron buyer because the tendency was downward and he had things pretty much his own way.

Opening January 1 at 1.75 cents minimum, the price was advanced to 1.81½ cents, the 1½ cents representing the 10 per cent. increase in freight from Pittsburgh, which made the new rate 16½ cents instead of 15 cents as it had been. From this time on through February, March and April the prices fluctuated between 1.80 and 1.86½ cents, dropping to 1.75 cents in May, 1.70 cents in June, 1.65 cents in July, 1.55 cents in August, 1.50 cents in September, 1.40 cents in October, 1.35 cents in November, with many sales made at 1.30 cents early in December. The price advanced, however, from that point to 1.35 cents and 1.40 cents late in the month. The price quoted in our issue of February 26 was the highest since June, 1900, and the 1.30-cent price quoted on December 3 was the lowest since November, 1900. In fact, the whole career of iron bars in 1903 much resembled that of 1900 in its decline from an abnormally high price to one extremely low, though the range of prices was not as startling as that of three years ago. Early in the year one of the large harvester companies placed a very large tonnage for the last half of the year at 1.75 cents, which was a concession of about 5 cents from the then market. Jobbers also bought heavily of iron bars at 1.75 to 1.80 cents. In February, buyers were covering their needs for months ahead at 1.77½ to 1.80 cents. An effort was made late in the month to consolidate in a pool the manufacturers of bar iron, but after a month's efforts along this line the proposed consolidation was abandoned. As late as April, lots of 10,000 tons for delivery in 1904 were sold as high as 1.85 cents. In May, railroads, wagon manufacturers and implement makers bought in 20,000-ton lots for forward delivery into 1904 at 1.80 to 1.85 cents. Then came the depression in values of iron scrap, leading to marked concessions in prices on bar iron in the latter part of June and throughout July.

Iron Crowding Steel Out of the Market.

By the end of August bar iron had reached a price where implement makers were buying it extensively instead of steel because of the great saving in cost, and for the next two months bar iron mills were kept busy to their utmost to supply iron to manufacturers who would ordinarily give steel the preference. Matters reached an acute stage in October, and early in November the manufacturers of steel bars, who had held prices absolutely without change through the year, made a sensational cut of $6 per ton on steel bars in order to check if possible the loss of their business to the iron bar mills. The iron men promptly met the figure made, with further reductions in prices, quoting iron as low as 1.30 to 1.35 cents, Chicago, as against 1.46½ cents, the new price on steel. The result has been that car builders, implement manufacturers, railroads and iron workers generally have bought more iron and less steel this year than they have for many years.

Bar Steel.

The year opened with a feeling in the trade that bar steel would be advanced in price because of the scarcity and high price of billets and the fact that the steel bar mills were months behind in their orders. Had it not been for the influence of the United States Steel Corporation the price of steel bars doubtless would have been advanced strongly, but this great corporation held the prices down by main strength, and thus discouraged the erection of bar mills throughout the country, as the price of 1.60 cents per pound, Pittsburgh, was but little in excess of the actual cost of billets to buyers, who could not wait for an indefinite time for their delivery At this time some independent mills secured a premium of $1 to $3 per ton for quick delivery on bars. In February, March and April many thousand tons of steel bars were imported, the bulk of the tonnage being large rounds, which in the American market carried net extras amounting to from 25 cents to $1 per ton, importation being made to avoid these extras, as German bar makers sold their product at a flat price without extras for size. Late in the year the leading maker of steel bars reduced the selling price of large rounds and squares by granting quarter instead of half extras, thus securely padlocking the American barn door six months after Germany had stolen our horses.

In March and April large buyers placed orders for domestic steel bars at 1.76½ cents, Chicago, for delivery as late as July, 1904. In May there was a strong movement among large coopers and packing house interests in the purchase of steel hoops, contracts being made extending far into 1904, supposedly at the fixed price of 2.06½ cents, Chicago, for 250-ton lots or greater, with full extras for size. In July the International Harvester Company offered to buy 50,000 to 75,000 tons of steel bars if a concession of $1 per ton were made. Whether the order was placed at that time cannot be ascertained. The active buying of hoops continued through July, but probably at a slight concession, some mills not in the United States Steel Corporation offering lower prices on specifications that carried good extras. July was an active month throughout in bars, bands and hoops. In August the lower cost of billets permitted independent mills to begin to make concessions on steel bars, and a number of smaller mills took specifications sufficient to run them for the balance of the year at $1 per ton under the market. In August the International Harvester Company bought 40,000 tons of steel bars for 1903 and 1904 delivery, presumably securing a concession from the association price.

Steel Battles with Iron and Meets Defeat.

Through July, August and September the competition of iron bars became more and more marked, and both jobbers and steel bar mills felt keenly the loss of their trade in steel bars. This condition grew worse in October, and by November had reached such an acute stage that the United States Steel Corporation, which had been as firm as adamant in its price of steel bars, made a cut of $6 per ton, reducing the price from 1.76½ to 1.46½ cents, base, half extras, Chicago, in carload lots. This cut, the greatest reduction at one time in the history of the bar steel market, did not have the desired result immediately, though toward the end of December buying was resumed with fair activity, in spite of the fact that iron bars were sold in large tonnages at $2 to $2.50 per ton less than the new low price on steel. At the time steel bars were reduced $6 per ton hoops suffered a reduction of $5 per ton, small angles and channels $6 per ton, and a number of agricultural shapes in the bar class from $5 to $6 per ton. Cold rolled shafting was at this time reduced an equivalent of about $5 per ton, discounts being raised from 47 to 52 in car lots and from 42 to 47 in less than car lots.

Structural Steel.

The great activity in building operations, notably in the construction of steel buildings for cities and steel bridges for railroads and highways, in the closing months of 1902 led to such a congested condition of the structural steel mills that at the opening of 1903 not only many of the large producers but the independent companies as well were six months to a year behind their orders. This was one of the instances where official prices of a product are of slight value in making a critical study of the market itself, and while the United States Steel Corporation and other large companies who were of a like mind officially held the price of angles, beams and channels at 1.60 cents per pound, base, Pittsburgh, independent mills who were able to make deliveries had no difficulty in getting from $3 to $5 per ton higher from customers who could not wait the many months that would elapse before receiving the material if they gave their orders to the large companies. The events of the year, not only in structural materials but in other lines as well, demonstrate that a great selling force can, by the exercise of firmness, hold prices down when the law of supply and demand would raise them, but that it is

extremely difficult for any human power to hold prices up higher than the laws of supply and demand dictate.

Building operations were active in the first half of 1903. Steel for the Railway Exchange Building, Rock Island Depot, First National Bank Building and 20 smaller structures in Chicago was placed during this period. Railroads were heavy buyers for bridge purposes, car builders bought large tonnages of angles, beams and channels to go into the thousands of cars that they were rushing through for the railroad companies, and large warehousemen who had ordered supplies six months to a year ago were able to sell carload lots of structurals on track at store prices instead of putting them into their stocks, receiving from 2.25 to 2.75 cents per pound for shapes that had cost them 1.50 to 1.60 cents, Pittsburgh. One 600-ton building for Elgin was sold from a Chicago jobber's stock and a hundred smaller structures drew their steel necessities from similar sources at 2.50 cents per pound or higher. Jobbers at this time, carried away with their success, ordered thousands of tons for their warehouses and in every way increased their facilities for storing and handling this product. Car builders bought 10,000 to 15,000 tons during April, much of it coming from stock. A Chicago architect placed in the first week of May contracts for steel for the following buildings among others: Wanamaker Building, Philadelphia, 18,000 tons; Wanamaker Building, New York, 15,000 tons; First National Bank Building, Cincinnati, 4500 tons, and the Merchants' Exchange Building, San Francisco, 4500 tons.

Labor Cloud Appears.

At the close of April a labor cloud appeared on the horizon and buying suddenly fell off to a point where mills had a fair opportunity of catching up with their orders. By the middle of May it was possible to secure structural steel at the official price of 1.75 cents, Chicago, without paying a premium for prompt delivery. All through May and June the repeated strikes of structural iron workers and the general unsettled condition of the labor market led to dullness in the structural steel business, the only large buyers being the builders of bridges.

In August came the exposure in the courts of a ring in the city of Chicago made up of labor unions and certain contractors, who by acting in collusion had made it impossible for contractors not in Chicago to do work in Chicago without suffering ruinous strikes at the hands of not only their own workmen but the men employed in making and hauling materials. This still further dampened the ardor of the market in Chicago itself, although at outside points the buying continued fairly brisk, car builders and railroad bridge builders doing a steady business and buying heavily. On November 1 Chicago jobbers who had in the aggregate between 20,000 and 30,000 tons of structural steel in their yards became alarmed at the dearth of orders which they were receiving for this material and made a cut of $4 per ton, the new price being 1.90 cents per 100 pounds, instead of 2.10 cents, which had been the price for several months.

Territorial Price System Abolished.

Structural steel, like steel plate and cold rolled shafting, had been sold at a certain fixed price within given territorial limits, the United States being divided into 17 districts, in each of which the price was uniform, regardless of the varying freight costs from Pittsburgh. In the last week of November the manufacturers of structural steel abolished this method of selling and made a base price of 1.60 cents, Pittsburgh, the selling price at any point being ascertained by adding the full carload freight rate from Pittsburgh to destination. In Chicago this new method of selling structurals increased the price 30 cents per ton; in Milwaukee it increased it 70 cents per ton, and at some points $1.50 to $2 per ton was added to the delivered price. On the other hand, some nearby points with low freight rates found their price of structurals decreased from 50 cents to $1 per ton.

By "structurals" in this article are meant angles 3 inches and larger on one leg, channels 3 inches and larger, and beams, tees and zees larger than 3 inches. It is one of the "freaks of trade" that these heavy sections, which run into tonnage, should be held at $6 per ton higher than the smaller sections of the same shape. These light angles, channels, tees, &c., were reduced to 1.30 cents, Pittsburgh, along with bars.

Boiler and Tank Steel Plate.

Steel plate was officially quoted throughout the year at 1.60 cents per 100 pounds, Pittsburgh, for tank quality, ¼ inch and heavier and less than 100 inches in width, with extras for lighter weights and greater widths, and for boiler, marine and locomotive qualities, but the buyer in the first four months of the year who wished anything like prompt deliveries could only get them by paying a premium of from $2 to $4 per ton. Mills in January, February and March were six to eight months behind in their orders, and it was not until July that the leading producers caught up with their customers and were able to make deliveries within reasonable time. All the mills had been pushed throughout the year to their utmost, in many cases with three shifts of men, producing a tonnage that is pretty sure to surpass all previous years. In August the boiler makers' strike in Chicago and other centers hurt the plate business severely, and by the time these strikes were settled all the mills had caught up with their orders. During the last few months of the year several independent plate mills with small capacity cut prices on tank and flange steel of widths within their range from $1 to $2 per ton and secured a large volume of business on this basis. In general, however, prices of plates were better maintained than any other commodity, and business in most cases has been a most satisfactory one.

In December the Plate Association made a radical change in its system of selling. Up to that time delivered prices had been made according to districts, all buyers within any given district paying the same delivered price, while their neighbors on the other side of an imaginary line were paying 50 cents to $1 per ton less or more, according to the price established. This system, though a great convenience to the seller, often wrought injustice to the buyer, who had to compete with neighbors in the next lowest price division. So many complaints had been made on this score, and also because the shipper insisted on controlling the routing, often to the inconvenience of the buyer, that the district plan was abolished and a base price of 1.60 cents per pound, Pittsburgh, adopted, to take effect January 1, 1904. In Chicago, Milwaukee and other points, where the new base price, plus full freight, will make a higher delivered price than before, large buyers ordered heavily tween December 20 and 31 at the old association price of 1.75 cents, delivered, anticipating their needs for months to come.

Sheet Steel.

The scarcity and high price of sheet bars early in the year seriously crippled independent mills, and an effort was made to merge all the independent sheet mills with independent billet mills, so that sheet bars could be secured from other sources than the United States Steel Corporation. By the time that this plan had reached a degree of completion toward the middle of the year the necessity for it ceased and the matter was dropped. The policy of the United States Steel Corporation to forestall competition by holding up prices on raw materials and forcing down prices of finished products was consistently adhered to in the sheet business, as independent sheet mills had to pay from $32 to $35 per ton for their sheet bars, at which price there was claimed to be no profit in selling their finished sheets at the schedule of prices adopted by the corporation. The price-list quoted the first half of the year by the large producers was on the basis of 2.65 to 2.70 cents per pound, Pittsburgh, for No. 27, one pass cold rolled, Bessemer sheets, with an extra of $1 per ton for open hearth. This made the price 2.81½ to 2.86½ cents, Chicago, in car lots, for Bessemer. Independent mills in the early months were able to sell at a slight profit, notwithstanding the high cost of sheet bars, by securing a premium of about $2 per ton for prompt shipment.

Galvanized sheets sold in January, February and March by the leading producer at 75, 10 and 5 per cent. discount at the mill, in car lots; but as the largest producers were far behind their orders, the independent mills were able to advance the price in March to 75 and 7½ per cent. discount for the ordinary buyer and 75 and 10 in large lots.

The second quarter opened strong, with mills eight weeks behind their orders and prices firm, with one pass cold rolled No. 27 selling at 2.86½ cents, and galvanized at 75 and 5 per cent. discount, both quotations being for car lots, Chicago. This strength was checked by a strike of metal workers' unions in many large manufacturing centers, and by the end of May the hand to mouth system of buying began.

In July it became evident that independent mills had caught up and were out for new business, even at a reduction of $1 to $2 per ton below the so-called "trust" price. In August the International Harvester Company bought 11,000 tons of steel sheets. In September the price on No. 27 gauge, one pass cold rolled, fell to 2.55 cents, Pittsburgh, or 2.71½ cents, Chicago. This price was shaded by independent mills to about 2.65 cents, Chicago. Galvanized shared in the weaker tone, mills

being eager for business at 75, 10 and 5, Pittsburgh, or 75 and 10, Chicago. On September 1 the independent sheet manufacturers formed an association to force the Amalgamated unions to accept reductions in wages or to remove their arbitrary restriction of output, or both. By means of this association reforms were brought about in December which more nearly placed the mills employing union labor on a competitive basis with non-union mills.

September prices prevailed through October, but in November three successive reductions brought the price of 17 gauge, one pass cold rolled, box annealed sheets down to 2.51½ cents, Chicago, or 2.35 cents, Pittsburgh. Two reductions in December made the closing price for the year 2.25 cents, Pittsburgh, or 2.41½ cents, Chicago, with local mills willing to sell as low as 2.35 cents, Chicago. The difference between the high and the low prices of sheets for the year averages 50 cents per 100 pounds, or $10 per ton, and this commodity enters the new year with less strength than almost any other form of finished steel.

The Inland Steel Company, whose new plant is at Indiana Harbor, Ind., just outside of Chicago, have played an important part in the sheet steel business of the West. With a plant equipped with all the latest labor saving machines and methods, and with their own billet mill for supplying their necessities in open hearth steel, this company enjoy a strategic advantage in the West. During 11 months of the year their sheet mill was operated at its utmost capacity and was finally forced to close down in order to bring its union laborers down to a basis of wages and output that would permit it to compete with the nonunion mills further East. The labor troubles are solved and the plant enters the new year with a fair tonnage on its books.

Billets.

The feature of the billet market during the year 1903 was the importation of many thousand tons, principally from Belgian and German works. This importation was made possible by the high prices that prevailed during the first half of the year, but more particularly by the shortage of steel in domestic markets and the impossibility of mills to promise deliveries inside of five to eight months from date of order. At the first of the year, though the official price of billets was $30 to $31 per ton, the consumer was paying $36 to $40 for domestic open hearth billets, with no producer willing to promise delivery before July. At that time German billets were being laid down in the Chicago market at about $30 per gross ton, this price including duty and freight to destination. By February the nominal price on domestic Bessemer billets for rerolling was $31 per ton, but the average consumer was paying $34 to $40, Chicago, in 100-ten lots. At this time European billets were being delivered at the seaboard at from $27.50 to $28. On February 26 3000 tons of German billets were bought in Chicago at $30.75, duty paid, for March, April and May delivery, and in March an order was placed for 2000 tons of German billets at $31.50, Chicago, for delivery in the second quarter. At this time open hearth forging billets were selling to the trade at about $40 and Bessemer billets for enrolling at about $35, notwithstanding the fact that the official quotation of the leading producer remained at about $31. In April German billets were bought in Chicago at $31.50 to $32, which was the nominal quotation for domestic billets, but mills were so overcrowded that they could not promise deliveries before the following winter. There were also few open hearth forging billets of domestic make available. A local concern in April sold 10,000 tons of German sheet bars and slabs at $32, seaboard. So great became the scarcity of billets that the United States Steel Corporation transferred one of its largest mills from the rolling of rails to billets, notwithstanding the fact that the rail shortage itself was acute. Domestc billets were being quoted at about $32 for Bessemer and $33 for open hearth for delivery the following winter, though $34 to $38 were asked for 30 to 60 days delivery. By the end of April the situation became worse and local consumers were buying German billets at $33.25, Chicago, for May, June and July shipment. The shortage in wire rods at the same time was estimated to amount to 50,000 tons.

Early in May it was stated that the leading producer had made a sale of 1500 tons of Bessemer at about $33, Chicago, for June and July shipment and 10,000 tons for the last half of the year at 50 cents less, as well as 500 tons of wire rods for May and June shipment. Six thousand tons of German billets were sold at $28.50, tidewater, and $32.50, Chicago.

In June the largest buyers of rerolling billets were paying $29.50 for Bessemer and $30 for open hearth, for fall delivery, while the ordinary consumer paid $35 to $38 for open hearth forging billets.

In July an official price on billets was established by the billet pool at $28 for Bessemer rerolling billets and $32 for open hearth forging billets. Following this action on the part of the billet pool large agricultural implement interests bought about 12,000 tons for delivery at Chicago at the association price. The premium for prompt delivery remained in force through August, the August price for forging billets being from $33 to $38, according to quantity, quality and buyer. But by September the situation cleared up decidedly and premiums were lost sight of.

In October open hearth billets were being quoted at $29 in the Chicago market, and no questions were asked as to whether they were intended for forging or rerolling purposes. November saw the billet pool practically a dead letter, and buyers were able to secure billets either for forging or for rolling purposes, either Bessemer or open hearth, at $28, or less. By the middle of the month this price had dropped to $24, Chicago, which price prevailed during the balance of the year. The billet pool gathered itself together again in December and reduced its official price to the basis of $23, Pittsburgh, or $24, Chicago, for Bessemer or open hearth billets for any purpose.

Merchant Steel.

The exceptional activity of the month of December, 1902, which was 50 per cent. greater than the previous December, continued through January, 1903, but fell off remarkably in February, by which time the implement manufacturers had come to a realizing sense of the fact that a larger number of machines than usual had been carried over from the previous year. This surplus of machines was particularly great in the flood stricken district of the Southwest. Another element in the weakness of the season was a hope on the part of buyers that prices might be reduced. During March a number of large wagon manufacturers and small implement makers entered into contracts for delivery of tire steel, smooth machinery and open hearth spring steel for delivery, running as far forward as July, 1904. In the following month this contracting movement was at first limited to the smaller buyers, but about the middle of the month some of the large factors entered the market and covered their requirements up to the beginning of the second half of 1904. One of these contracts was large, and it seemed to be the signal for a temporary improvement in the demand for steel of this class. But it did not last long, and soon the policy of holding off on contracts continued to be more general. Instead of contracting, as is their habit, for an entire season's tonnage at a fixed price, many large implement manufacturers took their chances of buying carloads at a time in the open market, hoping, in this way, to force a cut in price. May, June and July were active months, particularly in cold rolled shafting. In August some of the large agricultural implement firms, who had been accustomed to placing contracts for a year or 18 months ahead, finally placed contracts for only six months' requirements. Many contracts began to be made about this time in which the buyer forced the seller to insert the clause guaranteeing against decline in prices. Buyers of high grade specialty steel, such as enters into agricultural implements, were not slow to see that the billet market grew weaker and weaker toward the latter end of the year, and they hoped that finished steel products would decline in sympathy with the raw material. About this time a new disturbing element entered the market in the shape of a mill that had perfected a process for the making of soft center plow steel at a much smaller manufacturing cost than any of the old systems, and this firm began bidding for contracts among the large users of this product. Early in September one large user, at least, was induced by an old manufacturer of soft center plow steel to enter into a contract for five years, it being understood that a marked concession in price was made in consideration of the length of time covered by the contract. Early in November, when the price of soft steel bars was cut $6 per ton by the leading producer, similar cuts were made in many of the classes of steel belonging to this head, among which are: Open hearth spring steel, cut from 2.50 to 2.25 cents, a cut of $5 per ton; smooth finished machinery steel, 2.01½ to 1.71½ cents, $6 per ton; smooth finished tire steel, from 1.96½ to 1.66½ cents, a cut of $6 per ton; toe calk, from 2.31½ to 2.01½ cents, a cut of $6 per ton; cutter shoe, from 2.41½ to 2.21½ cents, a cut of $4 per ton; sleigh shoe, from 1.86½ to 1.51½ cents, $7 per ton; cold rolled shafting, from 47 per cent. off in car lots to 50 per cent. off in car lots, a cut of about $5 per ton.

In open hearth spring steel, while quotations were given at Chicago during the whole of 1903 up to this cut at 2.66½ cents per pound, the same material was being quoted all through the second half at Pittsburgh at 2.30 cents, which would make the price 2.46½ cents, Chicago. Following the cut to 2.25 cents, open hearth spring steel sagged until it was being quoted in November at 2.01½ cents, Chicago, which was cut to flat 2 cents, the price at which this product enters the new year.

The months of October, November and December were famine months, whereas they are ordinarily heavy ones, but specifications on old contracts and the making of new contracts began shortly after the cut in the bar price, and the last two weeks of December were extremely active ones for the selling agencies concerned in the various grades of merchant steel. It is the feeling in the trade, however, that the implement manufacturers and machinery builders, the largest users of these grades of steel, have done but little more than to cover their actual working necessities, and that buying in 1904 will be extremely active in order to make up for the lost time. The average implement builder is in a position now where he must either buy steel or close his works, and the firm stand taken by the billet, structural, plate and bar interests against any further concessions in their prices is giving a confident tone to the market, and it now looks as if the large users of merchant steel have accepted as final the ultimatum of the leading producers and that the first quarter of 1904 will see a large and active business in these lines.

Rails.

A study of the official prices quoted on rails during the year 1903 gives no indication of the actual market price paid by the average buyer of that product. Rails from January 1 to December 31 have been officially quoted at the same price of $28 per gross ton for standard sections in large lots at makers' mills. But a buyer last January who wished rails delivered inside of three or four months would have to go to some independent producer, who would allow himself to be coaxed by a very fancy premium to turn out the rails promptly. The United States Steel Corporation mills in last January were sold up to the end of 1903 at $28 per ton, having on their books more than 2,000,000 tons for shipment at various dates clear up to the close of the year. Light rails were sold at $38 to $40 or $45, depending on the section, the quantity and time of delivery. Any second-hand rails that were good enough to pass inspection as relayers would find ready buyers at $31.50 to $32 per ton, and if new rails could have been secured, many railroads would have offered as high as $35 per ton for them on delivery the first quarter of the year. This was a period in which railroads were laying hundreds of miles of new rails that cost them $28 and selling their old rails at about $32 a ton.

In February a Pacific railroad imported 10,000 tons of steel rails from Germany in order to save time, probably paying for them as much at least as the official price of $28 per ton—possibly more. All through February the demand was active both for standard and light sections, the bulk of the latter being for 30 to 40 pound weights bought by electric railway companies. March was a little quieter, but in April the market was strengthened by large purchases and inquiries, one Western road giving 20,000 tons, partly to Eastern and partly to Western mills, at $28, f.o.b. mill, plus full freight to destination. Relayers all through the month of April were selling at $31.50 to $32 and were hard to get even at that price, and light sections were in good demand at $35 to $40. Orders were placed in April and May for very large tonnages of standard sections for November and December deliveries. To make matters worse, toward the end of the month one of the largest rail mills owned by the United States Steel Corporation, having a capacity of 42,000 tons per month, was turned off of rails and onto billets. Most of the orders placed between March and July went to Eastern rail mills, because the mills in the Chicago territory were long since sold up, one of these mills selling 11,000 tons per month, as against its maximum rolling capacity of 6000 tons. Fortunately for all concerned, the business slacked up in May and June, giving the mills somewhat of an opportunity to catch up with their orders.

Late in June the leading producers got together and extended the price of $28 so that it covered the whole of 1904. Western mills at this time booked contracts for about 200,000 tons of rails and 125,000 tons were in prospect. Eastern mills booked a like tonnage. The tonnage going to Western mills was divided about as follows: Chicago, Burlington & Quincy, 40,000 tons; Chicago, Milwaukee & St. Paul, 40,000 tons; Chicago & Northwestern, 40,000 tons; Chicago, Rock Island & Pacific, 25,000 tons; Illinois Central, 25,000 tons; Lake Shore & Michigan Southern, 25,000 tons; Nickel Plate, 5000 tons. The Pennsylvania gave to the Carnegie, Cambria and Pennsylvania steel companies orders for about 200,000 tons. Later in the year much of this tonnage was, however, canceled or deferred. By the middle of June Western mills had added 100,000 tons to the above list, including 40,000 additional tons from the Chicago & Northwestern and 12,000 tons from the Santa Fé. Up to this time relaying rails had been active sellers at from $31 to $32, but late in July the price was cut to $29, at which price large tonnages were moved.

August witnessed a revulsion of feeling and railroads that had been clamoring for delivery of their rails began sending in orders to the mills either canceling their contracts or extending them into 1904. Orders for prompt shipment were still plentiful, though rail buyers, influenced by the successive reductions in the prices of pig iron and in the weakness of the billet market, apparently made up their minds that rails would be lower before they were higher and accordingly delayed their buying. An indication of the spot rail market in September was another cut in the price of relaying rails to $24 per ton. Light rails fell in price also from about $38 per ton, the August price, to $34, the September price for 12-pound sections, with 30-pound selling $3 to $5 lower. In the month of October there were inquiries for an aggregate of 50,000 tons in the Western market, of which 15,000 tons were closed. The Santa Fé bought 12,000 tons in October and the M., K. & T. 8000 tons from the new Lackawanna Steel Company. These are thought to be the first large orders taken by that company for Western shipment, and it was understood when the orders were taken that they were all to be delivered before the spring of 1904. In December the closing prices of steel rails ranged about as follows: Standard sections, $28 per ton; 12-pound sections, $28 per ton; 16-pound sections, $27 per ton; 20-pound sections, $26 per ton; 25 to 40 pound sections, $25 per ton; relaying rails, standard sections, subject to inspection, $23.50 per ton.

The great activity in the construction of electric railways, although temporarily set back by the panicky condition of the security market, will lead to heavy purchases of rails during 1904. The fact that electric roads are building in every direction for carrying heavy passenger trains and also for freight traffic leads the majority of these new enterprises to call for heavier sections than has been the custom with electric roads. The Illinois Tunnel Company, who are burrowing under Chicago's streets in every direction, are equipping their rights of way with special rails weighing about 56 pounds to the yard, on which will be carried cars for the transportation of freight, mail and express matter. This improvement calls for 30 miles of rails and this mileage will be increased from year to year.

Average Base Prices of Finished Iron and Steel, 1903,

Delivered at Chicago in car lots from mill.

Months.	Common bar iron. Cents.	Soft steel bars. Cents.	Angles, beams, channels. Cents.	Smooth machinery steel. Cents.	Open hearth spring. Cents.
January	1.76½	1.75½	1.75	2.00½	2.65½
February	1.81	1.76½	1.75	2.01½	2.66½
March	1.84¾	1.76½	1.75	2.01½	2.66½
April	1.82	1.76½	1.75	2.01½	2.66½
May	1.80	1.76½	1.75	2.01½	2.66½
June	1.72½	1.76½	1.75	2.01½	2.66½
July	1.66	1.76½	1.75	2.01½	2.66½
August	1.62½	1.76½	1.75	2.01½	2.66½
September	1.53¾	1.76½	1.75	2.01½	2.66½
October	1.44½	1.76½	1.75	2.01½	2.60
November	1.38¾	1.54	1.75	1.81½	2.31¼
December	1.35	1.46½	1.76½	1.71½	2.00
Average for year	1.64¾	1.72	1.75	1.97¼	2.57½
Average for 1902	1.71	1.73½	1.75	2.00	2.55
Average for 1901	1.58	1.58	1.70	1.96	2.25
Average for 1900	1.75	1.75	2.00	2.25	2.80
Average for 1899	1.80	1.90	2.00	2.50	2.85
Average for 1898	1.05	1.10	1.25	1.55	1.81
Average for 1897	1.11½	1.13	1.19	1.53	1.66¼
Average for 1896	1.30	1.30	1.40	1.62½	1.87½
Average for 1895	1.25	1.37½	1.50	1.70	1.85
Average for 1894	1.10	1.25	1.40	1.70	1.85
Average for 1893	1.47½	1.60	1.82½	2.00	2.05

Old Materials.

A glance at the tables of prices, indicating the average of old materials in each month of the year and also the dates on which changes in price took place, tells the story of the startling depreciation in values during 1903. The gradual advance in prices in old materials in the second half of 1902 led to a feverish condition in the market, which was certainly not improved by extensive speculations which were carried on in these materials. The high prices of scrap and pig iron went hand in hand, and the scarcity in each was aggravated by the difficulty of getting cars to move the material. By the end of April, however, a change began to manifest itself. Railroads that had neglected the collection of their scrap owing to the scarcity of cars began throwing large tonnages on the market. Steel and iron mills that had been clamororing for more and more scrap suddenly discovered that it would be quite as well not to buy more than they needed for immediate consumption. April, May and June witnessed cut after cut in these materials, some lines losing as high as $2.50 in a single week. July permitted heavy cast scrap to rally somewhat, and in August inquiry became larger and sales of considerable magnitude were made. The first week in September some of the lines advanced 25 to 50 cents per ton, but a couple of weeks later there was a sharp cut of 75 cents to $2 per ton on all lines of old iron and steel. These reductions continued week after week until the closing

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quotations of the year show almost all lines of old materials 40 to 50 per cent lower than they were January 1.

Average Prices of Old Material, 1903,

Delivered Chicago in Car Lots.

Months.	Old iron rails. Gross tons.	No. 1 railroad wrought. Net ton.	No. 1 busheling scrap. Net ton.	Heavy cast scrap. Net ton.
January	$24.00	$19.50	$14.00	$17.30
February	24.00	19.50	14.00	16.62½
March	24.00	19.75	14.00	18.12½
April	23.75	20.40	14.00	17.80
May	23.75	19.12½	13.87½	16.75
June	21.00	16.12½	12.87½	14.62½
July	19.70	14.65	12.20	14.20
August	18.50	14.18¾	11.50	14.00
September	17.75	14.06¼	10.93¾	13.00
October	17.00	13.55	10.20	12.40
November	16.25	12.00	9.12½	11.62½
December	13.00	10.00	7.87½	10.50
Average for year	$20.28¾	$16.07	$12.05	$14.74½
Average for 1902	$23.91	$19.68½	$13.81½	$15.03
Average for 1901	19.50	15.00	10.80	11.25
Average for 1900	17.90	15.00	8.00	11.00
Average for 1899	21.00	17.25	10.15	12.40
Average for 1898	12.37½	11.25	6.62½	8.15
Average for 1897	11.67	10.60	6.44	7.25
Average for 1896	13.50	11.20	7.00	8.48
Average for 1895	14.12½	11.08	7.67	8.37½
Average for 1894	10.83	8.80	6.85	7.50
Average for 1893	16.25	12.75	9.25	10.00

Prices of Melting Scrap, 1903,

Per gross ton, Chicago, in car lots.

January	$18.05	July	$16.30
February	18.12½	August	16.00
March	18.31¼	September	13.75
April	18.35	October	12.80
May	17.62½	November	11.25
June	16.50	December	9.00
Average for the year			$15.50¼
Average for 1902			17.37½

Merchant Pipe.

Nineteen hundred and three has been a good year for the makers of steel and wrought pipe, withstanding the fact that the books of many producers will show somewhat of a decrease as compared with 1902. It was not expected that the abnormal demand for pipe that was present during 1902 and the first half of 1903 could continue. Pipe mills throughout the country increased their capacities, many of them more than doubling. The largest item on the list of expenditures for improvements on the part of the United States Steel Corporation was that which concerned the erection and enlargement of pipe mills. A number of independent pipe mills were built, so to-day the sources of supply are more than ample to take care of any demand. The World's Fair at St. Louis was a large factor, swelling the abnormal proportions of the pipe sales of 1902, and by the end of this year that pipe will be turned on the market as second-hand, disturbing values until it is disposed of.

Pipe makers, on the last day of 1903, officially reduced their discount, making it 78 per cent. discount to jobbers, f.o.b. Pittsburgh, in car lots, with full freight to destination. The price for base sizes for all of 1903 had been 76 per cent. discount, Pittsburgh, to jobbers and 75 per cent. to consumers, or 74.35 to jobbers at Chicago and 73.35 to consumers. In February, 1903, independent mills, taking advantage of the congested condition of the National Tube Company's mills, advanced their prices for quick delivery. On February 26, 56 cars of pipe and fittings and 30 cars of cast iron pipe bought in 1902 were delivered at theWorld's Fair grounds in St. Louis. In March announcement was made that the National Tube Company would erect new mills at Lorain, Ohio, at a cost of $8,000,000. Mills and warehouses were oversold generally.

In March, 7 to 12 inch diameters were advanced from 73 per cent. discount to 69 per cent. In April and May mills were still from 30 to 60 days behind on their orders, but by July they had caught up with all sizes except the large diameters, which were still scarce.

One marked feature of the pipe business for the year has been the increase in the demand for steel and the decrease in the production of iron pipe, the average buyer concluding that steel was quite as good as iron for general purposes.

Official discounts remained unchanged throughout the year, though it was known that at the beginning of the second half prices were being shaded and then cut quite generally by independents, and that doubtless these concessions were met by the National Tube Company.

Cast Iron Pipe.

The price of cast iron pipe gradually decreased from $36 per net ton for 4-inch water pipe in January to $26.50 in December, in carload lots, Chicago. This decline almost parallels the decline in pig iron. Even this last named price is shaded $2 or $3 per ton when large inquiries are quoted upon. Large quantities of cast iron pipe sold in 1902 were delivered to the World's Fair grounds at St. Louis, the purchases of the Exposition probably forming in the aggregate a larger contract than was ever placed before by any one interest. The St. Louis Gas Company also placed an order for 4½ miles of 24-inch pipe to extend from their works to the World's Fair grounds. Minneapolis bought 45,000 tons of 6 to 30 inch water pipe in May, and a gas company at Indianapolis placed an order for 6000 tons. The year's business has been large, though difficulty of floating bond issues on the part of municipalities and public service corporations prevented many proposed purchases of greater or less magnitude.

The Lake Ore Trade in 1903.

BY DWIGHT E. WOODBRIDGE, DULUTH, MINN.

DULUTH, MINN., January 2, 1904.—When the season of 1902 closed with shipments 7,000,000 tons greater than ever before known, and when, a little later, it was shown that actual furnace consumption around Lake Erie for the year ending with April, 1903, had been 22,000,000 tons, it did seem as though there might be a higher top than had been touched. But the writer, early in June, 1903, made this statement: "A good many . . . are figuring that the Lake Superior ore movement this year will not exceed, if it equals, that of 1902. There are many causes that seem to indicate a lessened business. Strikes and unsettled conditions among consuming interests are among them, but perhaps the more potent is the fact that conservative steel makers are not going to buy ore ahead of requirements, as they did last year. A 25 per cent. excess of receipts over requirements cannot continue very long without making unwieldy stock piles." There had not only been such an excess of receipts over requirements, but ore from Lake Superior had been replaced, to an amount worth the serious consideration it did not receive by importations of product. Ore prices had been advanced from 25 to 75 cents a ton over the schedule prevailing for two or three years before, and the time honored differentials existing between old range and Mesaba ores were reduced; indeed, they were so far reduced that furnacemen found it to their advantage to buy certain Mesabas and non-Bessemer ores, making a Bessemer mix at a combined price under what ore people had figured possible. This resulted in a slack market for some grades and a sharp demand for others, a condition which characterized the ore market for the remainder of the year, to its utter demoralization.

Abatement of Demand for Ore Properties.

A change of conditions was notable early in the second half of the year, in the abatement of demand for ore properties and in the cessation of inquiry for explorations. Mesaba proven ore lands had been in sharper demand in the early part of 1903 than ever, and they had brought higher prices from furnacemen, whose needs were not filled for a long term of years. The bars of chemical analysis had been let down to such an extent that properties which a few years ago would have not been considered merchantable ore were readily accepted, and the basis of calculation of tonnage was reduced, in some extreme cases to an ore carrying 50 per cent. iron, and with no regard to the phosphorus content. For ores little higher, buyers were ready to contract a large annual tonnage at from 30 to 35 cents a ton royalty and a considerable cash bonus, the size of the latter depending on conditions and the complaisance of the sellers. Few properties were left long on the market seeking purchasers.

This all changed, almost in a night. There were no buyers; one could scarcely give away an ore property, and the argument of the hopeful seller, that ore was getting more and more confined and scarce, fell on deaf ears. Early in the year there had been not less than 250 drill outfits working on the two Minnesota ranges alone, and probably 75 more on Michigan properties. To-day less than 100 drills are busy in the entire Lake Superior region. Some of these are in Southern Wisconsin, in the new Baraboo fields, a section of Huronian rocks that may contain economically important deposits of ore, and are thought by many to have been proved to do so. No branch of the iron mining industry has suffered in the

past six months as has that of exploration, and there is nothing to indicate any very rapid recovery.

It is rather strange that this should be true, when the importance of ore reserves is so readily admitted everywhere and the expense of a well organized exploring department would be so slight a tax on many of those whose ore treasuries are none too full. The present, also, is a time when ores may be secured at prices far below what was freely paid a year ago, and the royalty charge has suffered a material decline.

Disappointment in Explorations.

The result of last year's explorations on Lake Superior was rather disappointing. A good many thousand dollars were spent on the Vermillion range, but, so far as is known, without much result, except to lead one of the exploring syndicates to decide to remain away from that region in future. There are not more than three drills on the range at present. On the Mesaba one or two good finds were made, and a number of small ore bodies were opened, most of them of low grade, some very badly mixed, some in such position that it is almost impossible to mine them, mostly non-Bessemer, and, all told, probably not covering more than 30,000,000 to 40,000,000 tons of available ore. These explorations, and the many more that drew blanks, emphasized the fact that the Mesaba has been pretty well explored, and that the future operator cannot hope for more than comparatively small ore bodies of medium grade. This being the case, every ore body left, and each one subsequently found, are sure to assume what would otherwise be an undue importance.

When the year opened some individuals were at work on what they called the Highland range, lying between Lake Superior and the Mesaba, and they had a very pretty theory as to the presence there of iron ore. This work has now long since ceased. To-day two or three drills are working some distance from Lake Superior, due west of Duluth. They are not supposed to have found anything of value.

On the south side of the lake the Gogebic range has had more or less exploration work, mostly in the way of underground development from existing mines. A little of this is proving up very well and may easily be of importance. All work that was under way a year ago in the magnetic schists on the western Penokee range has been abandoned. A so-called "south range" of the Gogebic is now under exploration in a few places, and with a sufficient force to prove the trend of any possible indications in a short time. On the Marquette range nearly all work that was in hand a year ago has ceased. There are, on the other hand, some new developments that may be of importance. Several parties are at work in the vicinity of the old Taylor mine, near L'Anse, and abandoned many years ago. These have sunk many test pits and have drills in ledge. They claim to be meeting with encouragment. In the region south of Swanzey leading producers have taken lands and are working along slowly and carefully. Almost nothing in the way of exploration is under way on the Menominee range. In the whole magnificent sweep of Canadian country around the northern side of Lake Superior, the explorer is idle.

Exploration in the Baraboo field of Southern Wisconsin is alive and active, but it has its difficulties, and it will be necessary that many things be explained satisfactorily before the mining public can be assured that the region is the very important addition to the iron ore supply of the Northwest that was hoped.

Initial experiments made the past year with sandy ores of the Western Mesaba, and which, if successful, might add to available tonnage an amount impossible yet to estimate, have not been as gratifying as hoped for. But the problem will not be permitted to rest unanswered and will surely be taken up again, aided very much by what has already been accomplished.

Labor Conditions.

The condition of labor throughout the Lake Superior mining region in 1903 has been remarkably satisfactory. Strikes have been almost unknown. Compared with conditions prevailing in other industries, that governing the ore trade has been almost idyllic. The personal element in management, the touch of kindness here and there, the feeling of sympathy and regard, so common in this industry, could scarcely fail of their effect.

Statistics of Shipments.

Every port on the upper lakes has shown a decline from 1902 in the amount of its business. The figures for this and immediately preceding seasons of navigation have been as follows:

	1903.	1902.	1901.
Duluth	5,356,473	5,598,408	3,437,955
Two Harbors	5,120,656	5,605,185	5,018,197
Escanaba	4,277,561	5,413,704	4,022,668
Superior	3,978,579	4,180,568	2,321,077
Ashland	2,823,119	3,553,919	2,886,252
Marquette	2,007,346	2,595,010	2,354,284
Gladstone	85,816	92,375	117,089
Michipicoten	201,057	298,421	231,032
All rail	450,000	531,952	431,715
Totals	24,300,607	27,869,542	20,824,569

Minnesota has in the past year advanced her lead as the chief mining State, and closes it with a production of 59 per cent. of the Lake Superior product, probably nearly 49 per cent. of that of the United States. The United States Steel Corporation, whose product of Lake Superior ores in 1902 was a trifle better than 16,000,000 out of a total of 27,869,542 gross tons, have, in the past year, produced 13,455,035 gross tons, out of a total of 24,300,607 in the entire region, United States and Canadian mines. While a greater proportion of Minnesota mines are now idle than of those of other States, it is a comparatively easy matter to throw out large tonnage from them and to resume at short notice.

During the season of navigation 19,682,000 tons of ore shipped in 1903 went to docks along Lake Erie, the rest being taken to Chicago or distributed among furnaces scattered throughout the West. There are at the close of the year more than 6,000,000 tons of ore left on docks at Lake Erie awaiting the disposition to be made of it by furnacemen of the Central West. There is enough of this, including the amounts stacked at furnaces themselves, to last far beyond the middle of the new year. Whatever favorable breath of trade blows upon and revives the steel making industry of the country, this vast weight of unconsumed material will act as a menace to possible large activity in the ore trade. Mines cannot hope to be more than moderately busy the coming 12 months, and the year 1904 will be more notable in this branch of the industry for the way in which it carries itself during protracted quiet than for any other phase of its development.

The Grangesberg Ore Company of Stockholm, Sweden, the official title being Trafik-Aktiebolaget Grangesberg-Oxelosund, have acquired a part of the interest of G. E. Brooms in the famous Arctic iron mines of the Aktiebolaget Gellivara-Malmfalt and of the Aktiebolaget Luossavara-Kiirunavara. The Grangesberg Company have bought 3001 1000-crown shares of the Luossovara Company and 1801 1000-crown shares of the Gellivara Company, with a two years' option on 5750 shares of the Gellivara Company, who in turn control 3609 shares of the Luossavara Company. The option, which is for the sum of 8,900,000 crowns, includes also 1774 shares of the Luossavara Company, but is subject to a royalty per ton on the product of the two companies.

The Warren Steam Pump Works of Warren, Mass., have acquired the entire machinery and equipment, including patterns and drawings, of the Slater Engine Company of Warren, who recently went into bankruptcy. The pump company will use some of the machinery in their present plant, and will retain the remainder in anticipation of increasing their capacity in the near future. They will continue to make repairs on the 200 or more engines that the Slater Engine Company have built, but will not build new engines. The business of the Slater Company will not be continued. The shop buildings occupied by the company are owned by an independent company and will be used for other purposes, though what these purposes will be has not been determined.

Chicago Machinery Trade for 1903.

With the opening of the year 1903 every manufacturer of machinery and every dealer and jobber was pushed to his utmost in attempting to supply the feverish demand for labor saving appliances. Business in January showed from 50 to 100 per cent. increase over that of December, though December had been a big month. Railroads bought heavily, new shops were springing up all over the country, and workers in iron and steel of every class were enlarging their plants and installing new machinery as fast they could get it from maker or seller. This boom period rather grew more intense than otherwise in February and March. Shops were running night and day, and all lines of machinery were active at high prices, with large premiums paid for immediate shipment from store. The improvement in the business in March was due to some extent to the fact that a betterment of freight service permitted a more liberal supply of raw materials than had been obtainable in months previous; but though machinery was sold at a high price, profits were not great, because of the excessive advances in wages demanded by union labor, and particularly because of their policy of giving as little as possible in return for their daily wage. In other words, manufacturing costs were high, materials were high and freight rates were advanced all along the line, while it was not possible for manufacturers and builders of machinery to advance prices in proportion to the advanced manufacturing cost.

March may be looked upon as the climax of the year's activity in general machinery lines, while April holds the record of engines, boilers and other equipment called for by steam and electric railways. In April the Allis-Chalmers Company started the manufacture of steam turbines in their Milwaukee plant. While most builders of engines, boilers and general lines of machinery had enough orders on their books to keep their plants running 60 to 90 days, here and there was sounded a note of warning and a suggestion of curtailment because of the hostile attitude of labor.

Widespread strikes of machinists and metal workers were inaugurated May 1, and small manufacturers and machine shop proprietors began to take a very pessimistic view of the future. Railroads, steel plants and traction companies were still optimistic and active. Ordinances passed by the City Council of Chicago, imposing heavy fines on owners of smoking chimneys and stacks, led to great activity in the sale of automatic stokers and smoke consuming devices, and a greater increase in business of the large corporations selling electric power. The scarcity of locomotive engines, both standard and narrow gauge, and the fact that locomotive works were many months behind their orders, led to an active demand for second hand and rebuilt locomotives at high prices.

The pace had been so swift in the first four months of the year that any obstruction in the right of way was bound to cause a serious wreck. This obstruction, in the shape of labor troubles in the month of May, led to wholesale demolition of values in June. Machine tools were particularly slow, and collections suddenly became difficult to make. Machine builders, everywhere, had increased their capacities, and now found themselves with larger works than they could keep employed. A number of large operations in the month, however, offset the depression in the general field. Among the more important of these large operations was an expenditure of $8,000,000 by the United States Steel Corporation for enlarging and improving their equipments at South Chicago, Joliet and North Chicago works, including a new open hearth plant, a blooming mill, structural mill, universal plate mill and a 6000 horse-power electric power plant. Another operation of the same company was the erection and equipment of a plant for the manufacture of cement from steel slag. The engines and machinery alone for this cement plant, which went to the Allis-Chalmers Company, cost $250,000.

The International Harvester Company bought heavily for their steel plant at South Chicago and their implement works at Hamilton, Ontario. The Grand Crossing Tack Company placed their equipment for the great open hearth steel plant. The Rock Island Railway placed their large orders for their shops at Moline, Ill. The M. K. & T., the Chicago & Alton, the C. B. & Q., the Missouri Pacific and the C. M. & St. P. also placed large orders for shop equipments. The Union Traction Company and Chicago City Railway Company made large extensions to the power plants and equipment. Pawling & Harnischfeger of Milwaukee commenced the erection of their new plant, and the Holthoff Machinery Company of Cudahy, Wis., came into the market tentatively for their new equipment.

In July the decline in general machinery business continued; so much so that producers were forced to look abroad for a market, with the result that exports in considerable volume were made to Africa, Mexico, South America, Canada and European countries. A hint of the situation in regard to raw materials used by machinery builders is shown by the fact that in this month machinery builders were able to buy domestic billets even for conversion into machines for export purposes at a price lower than they could import billets, without reference to duty, 99 per cent. of which was refunded on export machines. In other words, the Billet Association adopted heroic measures to prevent the importation of billets which had been so extensive in the first quarter the year.

During the month of July manufacturers of lathes increased their extras for attachments and also for length of bed. August opened inauspiciously with cancellations or withdrawals of a considerable portion of the large railroad orders that had been placed two months previously. The Western Electric Company bought heavily this month equipment for their new plant. The Chicago electric and surface railways also placed liberal orders. In fact, one of the bright features of the gloomy months that followed was the prosperity and activity of electric light, power and railway enterprises.

Another feature of business at this season was the fact that labor exactions, notably of the Steam Power Council, forced manufacturers on every hand to adopt gas engines and electrically driven machinery and tools, the demand being particularly for those of small and medium units. There was also a good demand for small lathes, drills, milling machines and grinders, and railroads bought a considerable amount of power transmission machinery. The electrical equipment for the Rock Island Railway shops, at Moline, was bought this month at a cost of $40,000. General business in Moline, Rock Island and Davenport, however, was unfavorably affected by the general strike of molders in the tri-cities.

September was a dull month in general lines of machinery and tools, owing to the fact that buyers of these lines, noting the reduced cost of raw materials, held out for lower prices on finished machines, demanding reductions that the attitude of labor made it impossible for the manufacturers to grant. Engines, pumps and transmission machinery were more active than previously, and one of the largest factors in this market stated that their shops were sold ahead far into 1904. Two large railroads who had canceled orders the previous month reinstated them in September. Taken altogether, however, September was a month of retrenchment, and as the majority of the laborers were so strongly intrenched that a cut in wages was impossible, the employers sought to save themselves by reducing their forces to the lowest possible point.

The last three months of the year were marked by no large operations, though business in many lines continued fairly active. Export business improved as domestic business fell off.

The feeling of financial unrest following the pricking of the Clergue bubble was accentuated by the ugly disclosures in connection with the United States Shipbuilding inquiry. These elements, in connection with the hostile attitude of labor, unfavorably affected the machinery and tool business in the last half of the year, and the hope of securing lower prices on finished machinery and tools on the part of the purchaser, on the one hand, and the delay in placing orders for their necessities on the part of manufacturers, had the effect of

making the closing months of the year periods of waiting to see what would turn up next.

Now that the water has been squeezed out of inflated securities and the iron and steel producers have clearly made known their prices on these products for 1904, the prospect is that business that has been waiting for the last three months will be placed early in this year and will bring about a renewed activity in this important market.

A Good Year on the Whole.

In spite of the comparative inactivity of the closing months of the year, 1903, as a whole, is reported by a great majority of machinery and tool manufacturers to be from 25 to 30 per cent. better than the year 1902 in point of gross receipts. Many of these firms, however, casting up the balance for the year, were surprised to find that the margin of profits had been much lower than they expected. Business was done under pressure at the maximum cost of material and labor, and it is not at all certain that the weak months at the close of the year did not show a larger proportion of profit, compared with expense, than the boom months of the winter and early spring.

The Forces Making for Business Improvement.

BY ARCHER BROWN, NEW YORK.

For six months or more we have been looking at the bad features of the iron situation. These are now firmly impressed upon the mind of both manufacturer and consumer. They form the staple of talk where two or three iron men get together. One experienced mill man (who but a few months ago was full of hope and enthusiasm) was heard to say that before we were through with this trouble it would be so dark that we could see the stars at noonday. His doleful prediction was but one of many which were heard during the closing months of the year. There is no room here for a psychological discussion, but if there were, it would be interesting to inquire why it is that the American people so suddenly and simultaneously change their point of view on business questions. Why is it that, with practically the same underlying facts and conditions, we are at one time rampant optimists, and a little later hopeless pessimists? Why is it that the speculative temper, as shown by Wall Street, will change in a night from the bear to the bull position? Why do we, in iron and steel circles, boldly proclaim on January 1, 1903, that the consumptive capacity of the country is practically unlimited; that the world outside is waking up and will want more of our stuff than we can supply; that prices can never again return to the low levels seen in the past, &c., and then on January 1, 1904, reverse our position and talk only of overproduction of material, of overbuilding of plants, of survival of the fittest, of failures for the weak and losses for the strong? Do the facts change sufficiently to alter the state of mind, or does the state of mind (persisted in long enough) actually produce the facts? Let each one answer this problem as he pleases, but let all admit the now well established principle that business is largely a state of mind; that when confidence exists we go ahead and have prosperity; when it is lacking, we slow down and have depression.

Now, when confidence is lacking, it is usually for some cause, technical or real. Perhaps I can better serve the purpose of a request for a review of conditions for the first issue of *The Iron Age* in 1904 by looking at the underlying facts, that make either for confidence or for distrust, than by any attempt at a statistical review or forecast.

We all admit that something is the matter. What is it? I say it is three things, bad enough, in all conscience, but not hopeless:

1. The collapse of the stock market in the summer, exposing the weakness of hastily organized and overcapitalized trusts, squeezing the water out of securities, knocking the speculative spirit flat, aggravating an already close money market, and spreading a vague feeling of anxiety, if not alarm, through the whole financial world.

2. Pushing up prices of materials of all kinds, particularly those used in building and construction work, to figures that stopped consumption.

3. Labor entirely beyond control, with increase of wages and decrease of efficiency, resulting in enhancing the labor cost of iron and steel manufactures to the breaking point.

There has been such ample discussion of these familiar topics and such general agreement as to their influence upon the situation that it hardly seems necessary to amplify them here. Rather let us turn to the other side of the picture and see what there is to support the view that the forces making for improvement are greater, as the new year opens, than those making for further depression. It will suffice to merely state the propositions, leaving it to the intelligence of your readers to supply the supporting facts and figures:

1. We have a sound and unquestioned money standard and a supply of currency ample for normal business needs, a condition that has not existed in any previous depression since the war.

2. The money value of the products of agriculture and mines—the sources of supply of the real wealth of the country on which all business is built—is vastly in excess of any previous year in our history. The destruction of $3,000,000,000 or $4,000,000,000 of supposed value by the fall of securities from unduly high to unduly low figures does not touch this.

3. As the result of great crops and mineral production, the excess of exports above imports is running beyond all past records. It has already paid the heavy debt of several hundred millions we owed to Europe early in 1903, and is now piling up a credit balance that is the astonishment of the world.

4. The railroad traffic of the country—a true index of the activity of the people—shows scarcely any diminution, in spite of the great falling off in iron and steel manufacture and shipment, and railroad presidents unite in the opinion that there will not be much decrease in 1904, so great and widely diffused is the prosperity of the people.

5. The steady growth of the world's gold supply, tending toward the enhancement of the values of commodities, the cheapening of money and the stimulation of business activity throughout the world.

6. The unbroken spirit of enterprise of the American people. As indicated above, this is a vital factor. Confidence, once destroyed, takes long to restore. The universal testimony is that confidence is not destroyed but, rather, only checked until careful men can inquire into underlying facts and see if anything serious is the matter. There is already proof that this inquiry is pretty well completed, and serious defects are not found.

7. The ever broadening use of iron and steel throughout the world, increasing (in spite of reactions) much more rapidly than the population of the world. It is this which justifies such bold predictions as those of Edward Atkinson, that the world, now using 40,000,000 tons per annum, will need 60,000,000 tons ten years hence, most of which America must supply.

8. Lack of accumulated stocks throughout the world. Apparently there is less pig iron on hand in this and all iron producing countries of the world than we imported from Europe last year to meet our home deficit, and the entire stock, say 1,100,000 tons, would not supply present consumption ten days.

9. The restoration of normal money conditions, enabling railroads to finance car trusts and other improvements, and easing, in all directions, the pressure which has been upon construction enterprises for nearly a year past. Bonds and pig iron go together. There is reason to believe that good bonds will soon be in demand, and that no sound and conservative building project need be abandoned for lack of proper financing.

This category might be further extended by a sane optimist with sound digestion, and I proudly claim membership in that class, but perhaps it is not necessary. We still need some rest and considerable readjustment, after the rush and confusion of the past two years, but I think

if the makers and consumers of iron will let the logic of these strong and hopeful facts filter into their consciousness, the stars at noonday talk will disappear, and some bright morning the country will wake up refreshed and confident, and go about its business as usual, not even taking time to worry about the Presidential election.

Malcolm McDowell.

Major Malcolm McDowell, who died on December 25, at his residence in Chicago, was born in Columbus, Ohio, in 1828, and the years of his early life were spent in and about Ohio. As a boy he "carried the chain" in a railroad construction gang, and helped to build and operate the Columbus & Xenia Railroad, about 1850. In 1852 he became connected with Henry Burden & Sons, Troy, N. Y., and from then on his mechanical and inventive genius developed. He was a forerunner or pioneer, and was years ahead of his time, but his advanced ideas later on came in vogue, and as a success made money and name for some one.

His first task was perfecting the system and machines for making horseshoes at the Burden Iron Works. At that time shoes were made by hand. The task of making the shoe was not the hardest; the horseshoer must be educated and his extreme prejudice overcome. This work Major McDowell undertook, and with success. He with Gen. Winfield Scott Hancock, at Fort Leavenworth, established the grading and numbering of shoes, which numbering is used to-day. With an immense soft clay field they got the impressions of the feet of thousands of horses, and from the averages secured established the numbers, &c.

In 1860 he went to the Providence Tool Company, Providence, R. I., and there was closely associated with George H. Corliss, and also the brilliant mechanics, Albert and William Angell. Just when his efforts here seemed to be crowned with tremendous success Fort Sumter was fired on, and he with his brother, Gen. Irvin McDowell, went to Washington and declared themselves for the North. It was interesting to hear him tell how he and his brother, while there, shook hands with old former associates, who decided to go to the South. Among these was Gen. Robert E. Lee. Major McDowell's war record was an interesting one. A close friend of President Lincoln, Secretaries Stanton and Dix, and a chum of Governor David Tod of Ohio, he was intrusted with many confidences and special duties. He was termed the fighting paymaster, and was often in the thick of battle. He was early appointed on his brother's staff, and was with him in the battle of Bull Run. He was called back to Ohio at the earnest request of Governor Tod and Gen. Lew Wallace, the latter placing him in charge of Cincinnati under martial law. At one time, on his own responsibility, he raised among his Cincinnati friends $500,000, and paid off the troops. It was with some little uncertainty that this procedure was transmitted to the heads at Washington, but the reply was gratifying. President Lincoln complimented him, said he wished he had more men with the head and nerve of Major McDowell, and backed up the transaction. His trip over the mountains in Kentucky and Tennessee with a small escort with huge sums of money, to keep his word with the men there and pay them off, was daring, and his experience inside of Knoxville, when it was besieged and he had on hand $14,000,000, which those in command recommended him to burn, but which he saved, is an interesting story.

Major McDowell was mustered out of the army without resources, and began business life anew. After boring for oil in West Virginia, in 1865, he built the street railroads over the suspension bridge from Cincinnati to Covington, and over the Licking River from Covington to Newport, and also the street roads in Newport and Covington. He then went with the firm of Gest & Atkinson, at Cincinnati, and again took up the line of improvement. He patented, at this place, the spiral spring, so generally used under passenger coaches, and at the same time got up a car run by compressed air, using a roller bearing on the axles.

In 1870 he went to Chicago, and entered the employ of the Union Screw & Bolt Company, where he used to good purpose the information he had secured while associated with the Angells in Providence. His work here was in the perfecting and improving line, and his genius came in good play, as was manifest in their product. His fundamental ideas in screw machinery are in use to-day.

In 1872 he built and ran, with others, the Chicago Steel Works, and there used his patent slitting rolls, with which he took the crop ends of rails and scrap rails, cut them into three parts with one pass, and rolled the parts down into material for making his spiral springs and other springs. When the old Exposition Building in Chicago was built the frame work was specified to be of steel, and the large girders and spider frames were looked upon by the architect and contractor as being a most difficult task. Major McDowell was called into consultation, and said he could do it. The work was handed over to him, and, although a new line, by unceasing work day and night he put up a perfect structure.

Later on he again went into the Chicago Steel Works, and made his patent plow beam, which, at the World's Fair, in Chicago, was given the pinnacle location in the column of achievements in the progress of agricultural machinery. It took a couple of years to get it on the market. With the plow beam he went personally among the farmers, and had it experimented with, and it gradually gained favor, and later became standard. He did not reap a reward in money from this achievement, but, as in all other things, he seemed satisfied to have it acknowledged as a success, and he started out with new ideas in steel.

Assisted by Winthrop Coolidge he built his patent steel wheels for agricultural implements in Chicago, and on account of the newness of the idea was forced to build all the machinery to do the work. His "hub and adjustment" was patented, as were also the "half round half oval" spokes and reinforced tire rolled on his patent rolls. This enterprise was later taken to Plano, Ill., where he formed the Plano Steel Works. Hard luck followed, and the steel wheel business passed along to others, when, later on, he saw his advanced ideas perfected, and the world somewhat benefited. His steel wheel was a success in others' hands, as were also his all steel harrow and steel bull wheel.

In 1888 he with his son Gordon and George Dole of Chicago started a gray iron foundry, at South Chicago. The major had been closely associated with Gen. Henry Rodman when he carried on a series of experiments for the United States Government, to ascertain the metal best suited for a large gun or cannon, which culminated in the establishing of a standard for gun metal, which was charcoal pig melted in a hot air furnace. Immediately upon entering this new field Major McDowell began to study it and look ahead. He said the gray iron should be made upon the same principle used by Bessemer in making steel. He at once began to have everything analyzed and to study the different actions of the elements involved. This was slow work, with few precedents to which to refer. He was in correspondence with English experts, and was much assisted by the work of Mr. Hadfield of Sheffield.

At South Chicago he established a metal he termed semisteel, but it was not until later on, when he was generously assisted by the Farrel Foundry & Machine Company of Ansonia, Conn., in perfecting it, and at that time had it accepted by the United States Government in lieu of air furnace metal for gun metal. This he accomplished at the Arsenal at Watertown, Mass., assisted by Major Reilly, where thorough experiments were carried on and tests made, and he fully demonstrated that, unlike hot air furnace metal, as established by General Rodman, his semisteel did not deteriorate with extreme strength as did furnace metal, and castings that had been rejected because the tensile strength was around 45,000 to 49,000 pounds per square inch were accepted, and cupola practice was the gainer. He was a thorough believer in mixing iron by chemical analysis from the first, and strongly advocated this practice before the different foundrymen's associations in the East and West. It did not look practical and feasible at first, but to-day its place has been established in foundry

practice and his predictions have come true. He was probably as thorough an expert on gray iron mixtures as this country has known.

During the past year he patented the McDowell steel cross tie and McDowell rail joint, as well as the machines and rolls for their manufacture. Both cross tie and rail joint have been highly approved by railroad experts. But he was not permitted to finish what he considered "the biggest thing he ever tackled," a system by which to make wrought iron in large quantities with the simplicity of making Bessemer steel. For 15 years he worked unceasingly on this problem. Every detail was at the point of his pencil, and it was his ambition to put with the rolling mill a pneumatic system of making iron that would be perfect. On this he spent the last period of his life, but passed away without seeing the iron industry benefited by his thought and work. During the past year he realized that he was near the goal, and hoped to see his dream a reality in 1904. In this he did not seem to look for the profit, but his continual expression was "to make the best and cheapest iron in the United States that was made in the world." Such men as John Fritz of Bethlehem, John Fraser of Pittsburgh, G. W. Plummer of Chicago, W. E. Stockton of Chicago, and numerous iron and steel men throughout the country were deeply interested in this last effort of Major McDowell, but he did his share toward giving ideas to the metal world, and all who knew him will give him full credit and rejoice with him in what he was able to do for others.

Notes from Great Britain.

LONDON, December 23, 1903.—During the past 18 months my reports have been bearish, if not actually gloomy, with here and there a bright spot, owing to some special circumstance. I regret to observe that the year is closing in gloomier circumstances and with gloomier prospects than since 1898, which may be said to be the year dividing the trade depression of 1894 to 1897 from the boom years of 1899 to 1902. Take two of our most important industries—namely, cotton and shipbuilding. Particulars of the general condition and prospects of the cotton trade are indicative of a serious situation. Thus, no less than 82 cotton spinning concerns report losses as a result of the year's operations. The failure of the cotton crop is mainly the disposing cause, but the cotton famine was partially foreseen, and it is impossible to resist the conclusion that there has been a good deal of miscalculation among a section of the community usually accounted the best business men in Great Britain. Any diminution in the activities of the cotton industry has a serious reflex action upon every trade and industry in Great Britain.

The shipbuilding industry has had a bad year of it. Shipbuilding has been at a discount since the close of the South African War, which liberated for mercantile purposes a great number of vessels engaged during the war in transport. As a consequence of this depression, several thousand men on the Clyde are at present idle, and prospects are far from encouraging. Shipbuilding is one of the chief industries upon which Glasgow thrives, and Glasgow is the second city in the Empire. Thus we have the cotton industry passing through a serious crisis, and, in addition, Glasgow is feeling the ill effects of depression in shipbuilding, which obviously carries in its train depression in many engineering departments.

Turn where we will, to any of the metal centres of Great Britain, the same gloomy story has to be told. For example, on the northeast coast steel ship plates have been reduced at Middlesbrough 2 shillings 6 pence per ton, thus bringing the price to £5 7s. 6d., less 2½ per cent., the lowest quotation since January, 1898. Again, on the northeast coast steel smelters have received notice of a reduction of 5 per cent. on their wages, and this, in its turn, may lead to a labor fight. During the past week several important announcements have been made, indicating the depressed condition of the Cumberland and Furness iron trade. Turning to South Wales, it is officially announced that, owing to serious depression in the Welsh steel trade, the masters have demanded a 15 per cent. reduction in wages. The employers and workmen are in conference.

All this points to serious conditions, and on top of it comes a threat of increasingly severe competition from Germany. I hear that a private meeting of iron and steel masters is to be held there on or about January 2 to consider the advisability of reducing prices all round for rails, bars and practically all save specialized products. It is believed that there may be a good deal of division of opinion, as many of the leading houses already find it difficult to make a profit sufficient to justify the increased expenditure which growing competition at home and abroad must necessarily entail. As to what America will do to intensify competitive conditions over here remains yet to be seen. British associated rail manufacturers have reduced the price of heavy rails from £5 5s. to £4 10s., and avowedly for the purpose of being better prepared for the American invasion. The general conclusion which I draw from the present state of the market is that American makers will find it more difficult to get in than during the last invasion.

To Visit America.

In response to a very cordial invitation from the Board of Direction of the American Society of Civil Engineers, it is proposed to arrange for a party of members of the Institution of Civil Engineers to visit the United States in September, 1904. It is intended that members should travel to New York in a body, so far as may be practicable. It is also proposed to visit the exhibition at St. Louis on or about the time of the congress of engineering, which is to be held there during the week beginning October 3. To this congress the members of the Institution of Civil Engineers have also been invited, as well as to avail themselves of the use of the headquarters of the American society.

The Forth Clyde Ship Canal.

An item of interest to the shipbuilding fraternity is the announcement that application for Parliamentary powers to construct a deep water canal between the Forth and the Clyde, via Loch Lomond, suitable for the passage of warships and deep sea vessels, has been postponed until the spring. The estimated cost of the scheme is £8,000,000, and toward this the Government is to be asked to contribute. The surveying of the probable route is still going on. S. G. H.

Transcontinental Freight Rates Advanced.

Because wages and supplies have advanced considerably above old levels, Western railroad companies will increase commodity rates an average of 17½ per cent. on January 18. The advance will affect nearly every pound of freight shipped by jobbers from Eastern and Middle Eastern points to the Pacific Coast and has compelled a readjustment of through tariffs. The lines agreeing to this advance are the Union Pacific, Southern Pacific, Great Northern, Burlington, Northern Pacific and Canadian Pacific, and it has been assented to by their Eastern connections.

Most of the rate changes in question apply to carload shipments, but adjustments on less than car lots have been necessary for the preservation of differentials. Some of the more important commodities affected by the new tariff, moving in carloads, are as follows, the quotations from New York and all other points east of the Mississippi River to the coast being as follows on 100 pounds:

	Old rate.	New rate.
Machinery	$1.25	$1.40
Structural iron and steel	.75	.85
Sewing machines	1.25	1.40
Stoves	1.15	1.35
Oil stoves	1.35	1.45
Gas stoves	1.35	1.45
Agricultural implements	1.15	1.25
Tinware	1.00	1.10

Merchants and shippers are understood to be much aggrieved, because they do not consider that they were granted sufficient opportunity to adjust their business to the changes about to be made. The first reliable information they had was conveyed in copies of the new tariffs.

The Iron Age

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DAVID WILLIAMS COMPANY, - - - - - - - - PUBLISHERS.
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JOHN S. KING, - - - - - - - - - - BUSINESS MANAGER.

The Iron Age.

FORTY-NINE YEARS AGO appeared a little sheet of eight pages that was destined to become what has long been recognized as the greatest and most influential trade journal in the world. It occupies the most important field of them all; that of the makers, workers and sellers of iron and iron goods—the metal, the machines and the appliances which during the past fifty years have revolutionized the arts and industries and even the conditions of our daily lives and have made this wonderful age what it is.

This field, though diverse in many of its ramifications, is really one. Its different parts are so interrelated and overlapping that a journal to fully represent any must treat of all. The hardware manufacturer and the country dealer are interested in the course of the iron markets and the progress of invention, as well as in the information given of hardware specialties; and the maker of iron or of machinery has more interest in advertising his products to the great variety of establishments which use them than to people of his own class.

A journal to gain and hold a predominant influence in such a field must be conducted with energy, intelligence and liberality. That this is true of *The Iron Age* is known of all. Its circulation is larger than that of any other trade journal in the world, being practically universal in its field, from the small country hardware dealer to the magnates of the trade. Its foreign circulation is greater than its whole circulation was when it was ten years old. The purchasing agents of more than seven-eighths of the railroad mileage of the United States, Canada and Mexico are its subscribers. It is constantly quoted by the most important newspapers of the country, and its market reports are regularly telegraphed to the leading dailies all over this country and to Europe.

The Iron Age Directory was established to round out the usefulness of *The Iron Age* as a medium of communication between buyers and sellers in all departments of the trade. In it we are enabled to give a complete enumeration of the various products of our advertisers, thus presenting them in greater detail than is possible for them in their advertisements, or for us in our weekly indexes. The last issue contained the names of 1414 manufacturers classified under the headings of 5223 different tools, machine and articles made by them. This book is the most striking presentation of the extent and variety of the American metal industries. And as all the manufacturers listed in it are regular advertisers in *The Iron Age*, it proves the extraordinary completeness with which this journal covers the field it represents. As it is furnished free to all subscribers, its distribution is very wide, and it is very largely referred to by buyers, both in this country and abroad.

To enable us to meet the requirements of our ever increasing business we were compelled, twenty years ago, to set up our own printing plant, running night and day. This has steadily grown, and is now among the largest in New York. We have for years made our own printing inks and have lately begun to make type. To print the ordinary *Iron Age* is recognized as "the heaviest job in the business." To get out such a number as this issue is an achievement.

The Iron Age is daily growing in circulation and influence. The reading matter is steadily growing larger in quantity and better in quality, at a constantly increasing expenditure. Three years ago forty persons occupied desks on our editorial and business floor; to-day there are sixty, and the force of our various branch offices has been increased. There is not in the world a trade journal organization to compare with it.

Thanking the members of the great trade whose support and approbation have made *The Iron Age* of to-day possible, and particularly acknowledging my obligations to my associates, a band of honorable, competent and earnest men whose equal it would be hard to find, I wish each and all of our readers a Happy New Year, and trust that we may all be spared to enjoy many more in health and prosperity. DAVID WILLIAMS.

Regulation in 1902-1903, Manipulation in 1904?

It depends entirely upon the point of view whether action taken to temper the fluctuations in a commodity be praised as regulation or be called manipulation, with a touch of condemnation. The existence of consolidations and of pools in the iron trade is largely based on the theory that maximum returns for themselves and the greatest satisfaction for the consumer can only be secured by avoiding the spasms to which the iron industry has been subject. Theoretically that is an aim which has the approval of all those who are identified with the iron trade, either as producers or consumers—of those who expect to make it their life work. It may not suit the man who only intends to make a turn in the stock market, or builds a plant with the object of selling out, or is convinced that he is endowed with extraordinary acumen as a trader. These classes may be disregarded in laying out broad lines of policy, although they may bear close watching at times.

It is hardly necessary to enlarge on the advantages which would accrue to one of the greatest industries of the country from steady markets, but there does not seem to be as general an appreciation as there should be of the great dangers which lurk in injudicious exercise of the powers which consolidations and pools possess.

No more striking illustration could be given than is furnished by the course of the Southern Pig Iron Association during the past two years. A task was undertaken far beyond its powers, and although this was only too obvious at an early date, the inherent weakness was ignored until the penalty was paid in the form of a thorough, if only temporary, demoralization.

It is this exaggerated consciousness of power, coupled with a curious timidity in facing a changed situation,

which is the greatest source of danger and which converts praiseworthy regulation to pitiable manipulation.

The iron industry enters the year 1904 under exceedingly peculiar conditions. One conspicuous fact must be kept in mind above all others, and that is that an actual monopoly does not exist in a single one of its leading branches. Never before have so small a number, when associated together, exercised so thorough a control, but never before have unanimity and harmonious co-operation been so absolutely necessary, because every individual company, through its strength, possesses an unlimited capacity for mischief, particularly during the days of an inadequate demand.

We are at sea, as we enter the new year, as to the requirements which may be expected. That they may be normal is all that the most enthusiastic optimist dares to claim. That they may fall considerably below that level is what many expect, and they are backed up in that belief by only too recent experience.

In the finished steel and iron branches the great interests who have assumed the task of regulation, of steadying the markets, have put themselves on record as holding that present prices are normal. The next two or three months will prove whether that view is correct. If it is shown that consumption recovers, then the level fixed can probably be maintained. If it does not, then the producers, if they hold together, possess the power to hold it in spite of adverse circumstances; but they would commit a grave error of judgment, which would be punished either by the long drawn suffering due to a restricted tonnage or by the acute ills of a sharp period of utter demoralization. The situation is critical in the sense that it calls for the exercise of the highest type of generalship. Shall 1904 bring wise regulation or timid and erratic manipulation?

A Revolution in Building Trade Agreements.

With the advent of 1904 a new era opens for the New York building trade. Ever since yearly agreements have been made between employers and the various unions, these agreements have expired at some time in the spring, usually on April 30. This arrangement was by no means satisfactory to employers, as it projected a controversy over wages, hours or trade regulations into what should be a very busy part of the building season, and often caused a great deal of valuable time to be lost by the cessation of operations until an agreement was reached. Further than that, it gave the unions a strong point of advantage over the employers, as the latter were, of course, anxious to proceed with their building contracts in the early spring and make as much headway as possible. Concessions were often made for this reason which would otherwise have been stoutly contested. It might be claimed, on the other hand, that the men were as anxious as the employers to work regularly in the pleasant spring months, but while this seems reasonable, it has not shown itself to be a consideration of much potency in governing the actions of workmen. The past year presented a favorable opportunity for making a change in this respect. The New York builders and contractors have been engaged in a controversy with the unions which continued the greater part of the year. Many issues were fought out, among them being the curtailment of the power of the walking delegate, who had grown to be an autocrat. Not the least important among the changes accomplished, however, was the substitution of January 1 for May 1 as the date for trade agreements to go into effect. This reform has just been announced, the plan to accomplish it having been kept quiet until enough contracts with unions had been made on the new basis to assure its success. The trades covered comprise the housesmiths, or structural iron workers, hoisting engineers, wood workers, sheet metal workers, metal lathers, electrical workers, plumbers, steam fitters and pipe and boiler coverers, with possibly some others. The agreements with elevator constructors expire on April 1; the bricklayers, plasterers and marble workers on May 1, and the tile layers on July 1, but under the arbitration agreement no strikes can be declared. The wages to govern these trades for the year 1904-05 have also been practically settled, so that no trouble is apprehended on that account. Ultimately, however, it is expected that all the trades will be induced to make their agreements date from January 1. It is understood that a similar movement is on foot in a number of other cities.

The new arrangement will be vastly more satisfactory than the old one for a variety of reasons, but chiefly for the removal of the uncertainty which embarrassed architects and contractors in making estimates of cost on the season's work. With agreements settled by January 1 they can figure on surer conditions, as labor, which is always the greatest element of cost, has heretofore been the most uncertain. The accomplishment of such a reform as this is one of the compensations for a year of practical renouncement of business by builders and contractors. Such a conflict had been impending for a long time, but was avoided by the employers, who knew that if it was precipitated it would ruin the building trade for an entire building season, if not longer. They made concessions until the situation became intolerable. The crisis was reached at the opening of the building season last year, when the walking delegates became more arrogant than ever, confident that the employers, with a great volume of presumably profitable contracts in hand and much more in sight, would yield every point demanded rather than suffer their operations to be interrupted. These walking delegates have had a rude awakening from their dream, being now shorn of much of their power to foment trouble. The employers, on the other hand, are in a position to embark with confidence upon the operations of the coming year. They look forward to a period of very great activity, as many building projects which had been postponed last year are being revived, and new ones are rapidly taking shape. The only contingency which may interfere with this roseate prospect is the possibility of capitalists being conservative in making building loans. But this is a contingency which is always possible and is therefore no more to be feared this year than in the past.

During the past week the leading daily journals in the country have printed many interviews with men conspicuously identified with the management of our great railroad systems. Many of them dwell upon the well-known fact that while gross earnings have been exceedingly heavy and have shown much improvement, net earnings have remained stationary, or have displayed a downward tendency. This is attributed to high costs from many different causes, the most potent of which has been the advance in labor. It is a striking fact that none of the leaders in conducting the business of transportation show any disposition to begin pruning down in this direction. To an industry so thoroughly dependent upon the railroads for regular operations as that of manufacturing iron and steel, this is very encouraging, because it minimizes the danger of any highly disorganizing conflicts with labor.

Mine Engineering on Lake Superior.

The past year has brought a notable change in sentiment as to mining methods in the Lake Superior region. The open pit system has been adopted at several points on old ranges, and with great success. It is destined to become more and more important there, but on the Mesaba range its overwhelming importance has just begun to be realized. It is not beyond the bounds of probability to state that there is scarcely a mine or an exploration in that region that could not be economically stripped for some form of open pit mining, and the day may not be far distant when an underground mine on the Mesaba will be a comparative rarity. Increasing costs of timber, additional control over large earth masses by reason of heavier machinery and greater skill, the extension of the milling system of mining and a questionable labor supply have been chief among the causes that have led mining men to consideration of deeper stripping and a general extension of the open pit methods.

Little of novel character has been undertaken during the year in the way of engineering and mechanical feats among Lake Superior ore mines. Important innovations, begun in previous years, have been carried to successful issue and have proved themselves all their sponsors urged. More notable than anything else is the permanent and substantial character of works undertaken nowadays for the winning of ore bodies. Splendid shafts are now sunk at great cost in rock, and are so placed that they will endure as long as the mines they are to tap can be hoped to remain. These are steel lined and steel capped with magnificent houses, equipped for the most rapid handling of product at least possible cost. Power plants and haulage systems are of a sort not previously possible. The best thought of the best engineers is directed toward a saving in costs.

Guaranteed Deposits.

A few years ago the proposition was made before the American Banking Association that national banks should, by a voluntary arrangement, guarantee each other's deposits. Little or nothing has been heard of the matter since, but the importance of such a guarantee to the banks and to the community, and the very slight expense or risk involved, entitle the proposition to careful consideration.

The State of New York has had one experiment in that direction and it was not successful, but it was far from being conclusive. The safety fund created by contributions from the banks under the law of 1829 was used not only to pay the notes, but all the liabilities of failed banks. After a number of bank failures had exhausted the fund, it was enacted in 1842 that note holders only should be paid out of the safety fund. The only fact decisively proved by this experiment was that the fund was not large enough. The banks contributed one-half of 1 per cent. of their capital until they had contributed 3 per cent. It does not follow, however, that a larger contribution, or even so large a contribution, would be needed now to accomplish the purpose of the fund. Banking is far better understood and is in the hands of far more responsible men than it was 60 or 70 years ago. The exhaustion of the fund was due, in part, to the fact that the regulations governing note issue were so loose that some banks increased their liabilities by unlawful means, which could not occur now. While this experiment was in progress, too, the Free Banking act was passed and no new banks entered the safety fund arrangement, and some withdrew from it. It is essential to any scheme of mutual insurance like this that the number of contributors should be large.

The report of the Comptroller of the Currency for 1902 shows that the total loss to creditors of failed national banks from 1865—a part of the item estimated—had been $37,956,941. This is a trifle less than $1,000,000 a year. The annual average loss to creditors was only 0.083 per cent. of the average deposits, or $830 on $1,000,000 of deposits. The contribution which banks would have to make would not be so large as to make the system impracticable.

It has been suggested that, with the deposits guaranteed, very considerable sums of money which are now withheld from the banks would be deposited. If the system were not universal, it is quite certain that banks which were parties to it would have a great advantage over other banks in getting deposits. It is not simply the individual depositors who would be perfectly protected, but the banks themselves in their dealings with each other, and in view of the large sums due by every bank to other banks this is an important matter. The advantage to depositors is so obvious that they could afford, directly or indirectly, to meet the expense of the guarantee.

The greatest advantage of guaranteed deposits would be the protection it would afford the community against panic. Modern panics have been much less disastrous than the early ones, because a spirit of co-operation has grown up among the banks and they help each other when attacked by runs, and help each other to help their customers. The issue of clearing house certificates is a method of making the aggregate reserves available for each bank. It has recently been proposed in New York to make this combination more complete and more direct in an emergency by actually putting all the reserves at the command of a clearing house committee. The guaranteeing of deposits would be merely an extension of an established system of co-operation.

Every panic leads to the withdrawal of large sums from the banks. This was conspicuously true in 1893, when the safe deposit companies of all the large cities did an unprecedented business, which began a long time before the panic broke out. In anticipation of the demands of their depositors, the banks must call in their loans or sell their securities, though the extent to which these steps have to be taken has been greatly modified by the practice of issuing clearing house certificates. The withdrawal of deposits impairs the ability of banks to meet the demands of their customers, which are larger than ever at the very moment when the banks have the least ability to meet them. This withdrawal of deposits, this hoarding of money lest it should not be possible to get it when needed, is the most striking feature of all panics, and it is the feature which makes panics dangerous.

With deposits guaranteed no one would have any temptation to withdraw money from the banks; there would be no hoarding, there would be money enough to go around and the banks would suffer no curtailment of their ability to extend credit. Under such conditions losses might occur in business; there might be bad times; but a panic would be nearly or quite impossible.

Whether an act of Congress could impose this system on the banks may be open to question, but the national banks, or banks both national and State, or the members of one clearing house association, could adopt it voluntarily, and the advantages of the system, if practicable, would be so great that the subject is deserving of the attention of all bankers.

The Year's Business in Mexico

DURANGO, December 28, 1903.—A review of Mexico's trade for the past year reveals a continuance of activity in the various fields of material development, and good business generally both in wholesale and retail lines. Notwithstanding the fact that there has been some anxiety in regard to possible legislative action in the direction of financial reform, the discussion of the question having been one of the leading topics of the year in business circles, the influx of foreign capital for investment has not been materially checked. Mining operations have been especially active. The importations of improved machinery for this important branch of industry have been large. New and rich discoveries of gold and silver mines have been made, and very large amounts of foreign capital have been invested in their development. The state of Oaxaca has proved to be a rich gold mining state, while in Chihuahua, and especially in the district of Parral, new mines, producing ore of high values, have added to the activity heretofore prevailing in that state.

Crops have been good, and prosperity is general. Imports of foreign merchandise continue to grow in volume, showing that the class of consumers of high priced products is continually increasing.

Building operations, particularly in the capital, have exceeded all precedent, which has had the effect of largely augmenting the demand for structural steel, builders' hardware, cement, and other materials used in this line. A like activity has been evident in plantation development, and an increased number of orders have been placed in the United States and Europe for sugar making equipments and other plantation outfits. The continual demand for tropical lands by citizens of the United States, for individual settlement or for company operations, may reasonably be expected to be followed by the placing of an increased number of orders for agricultural machinery and outfits required for the preparation of tropical products for market, since this class of investors is educated to the advantages which accrue from the use of modern tools and methods, and is usually well supplied with working capital.

In the line of manufacturing, aside from that of the preparation of products of the field, the year has been marked by the entrance of the Monterey Iron & Steel Company into the competitive arena as a producer of steel rails and other iron and steel products, and by the investment of United States capital in the iron plant at Tula, Jalisco. Several other manufacturing plants of less importance have come into existence. The prospects are that in the not distant future investors will give more attention to the establishment of manufacturing plants for the production of the almost innumerable articles for which there is a native demand and which are now imported. This action will naturally follow the development of the known coal fields and the possible discovery of petroleum in quantity, which fuel is still being actively searched for in several districts. Until the fuel problem becomes a less vexatious drawback to manufacturing enterprise, it may be expected that the greater part of the capital coming into the republic for investment will be placed, as heretofore, in mines, railways and agricultural lands.

The question of irrigation—one of vital importance to Mexico—is beginning to receive attention. A number of concessions were granted by the Government during the year to private persons for the carrying out of works of this class. Important enterprises in the way of electrical light and power works were either completed or commenced, chief among the former being the great plant built by the Guanajuato Power & Electric Company, on the Duero River, and among the latter the works of the Mexican Light & Power Company, at Nicaxa Falls, in the State of Puebla.

During the last half of the year the construction of new railways was less active than previously, probably owing to the currency agitation. Many new concessions have been given, however, and the coming year promises to see renewed activity in this direction. The purchase by the Government of large interests in three of the leading railway systems was an important feature of the year in railway circles.

In the matter of the public revenues, the fiscal year 1902-1903 exceeded all previous records. According to the report of the Minister of Finance, the total revenue was $76,023,416, a gain of nearly $10,000,000 over the year preceding, leaving a surplus of about $8,000,000 above expenditures.

The republic enters upon the new year on the flood tide of prosperity. Hope is paramount, as it well may be with a nation which possesses as assets an undeveloped domain of unlimited wealth in all the material elements which tend to make a country great, and with a busy and contented population, who are manfully learning the lesson of self dependence under the *ægis* of a wise government. J. J. D.

OBITUARY.

ROYAL C. VILAS, president of the Pyle National Electric Head Light Company, Chicago, died December 29, at his residence in Chicago, after a brief illness. Mr. Vilas was born in Ogdensburg, N. Y., in 1842, and became a clerk in the freight clearing house at Cleveland in 1862. In 1873 he was made general freight agent of the Erie Line, and subsequently freight traffic manager of that system. In 1890 he organized the New York Air Brake Company, of whom he was president until 1895, when he resigned to go to Chicago and engage in the manufacture of electric headlights for locomotives.

ROBERT SHORE of Shore Brothers, manufacturers of machinery, at Germantown, Pa., died January 2, in Philadelphia, of apoplexy, aged 71 years. He was born in England, where he learned the machinist trade, removing to Philadelphia 50 years ago.

J. SHIELDS WILSON, a well-known mechanical engineer of Philadelphia, died January 1, aged 69 years. He was born in Washington, and took up mechanical engineering early in life. He was employed by the William Cramp & Sons Shipbuilding Company, afterward with the Neafie & Levy Shipbuilding Company and later with J. T. Morris & Co. He became a large shareholder in the Wilmington Steamboat Company and was elected their president.

LESTER E. WOOD, who had been prominently connected with the cast iron pipe trade for many years, died suddenly of apoplexy, on January 1, while on his way from his residence in New York to visit a friend in New Rochelle. Mr. Wood was 56 years of age, and was born in Saratoga County, N. Y. During the Civil War he served in an Ohio regiment, commanded by his father, Colonel Oliver Wood. At an early age he became connected with the iron trade, and was at one time a member of the firm of Warren, Wood & Co., pig iron merchants, New York. For a number of years he was connected with the Anniston and Chattanooga pipe works, until they were merged into the United States Cast Iron Pipe & Foundry Company, after which he was appointed general Eastern sales agent of the consolidation. Resigning that position five years ago, he formed a connection with M. J. Drummond & Co., 192 Broadway, New York, as manager of their office. Mr. Wood had the reputation of being one of the very best pipe salesmen in the country. He leaves a widow and two children.

CLARK FISHER, chief engineer of the United States Navy, retired, died at his home, Whitehall, Whitestone avenue, Flushing, L. I., on the 31st inst., aged 69 years. Chief Engineer Fisher was born in Newport, Maine, and when 12 years old moved with his parents to Trenton, N. J. In 1859 he received a commission as third assistant engineer in the navy, attached to the "Iroquois." On July 12, 1861, he was captured at Magnolia Station, but managed to escape again that same night. From 1864 to 1868 he was in charge of the experimental station in the Brooklyn navy yard. He was promoted to the rank of chief engineer in 1870, and in the year following resigned to take charge of the anvil works in Trenton left by his father, which he had managed since then.

Prospects for 1904 in the Machinery Market.

From the viewpoint of the heritage handed down by the year just closed, the new year augurs well for a period of sound prosperity. This inheritance is a vast amount of projected and unfinished work. The conditions now are infinitely more desirable than those which existed but a short time ago.

To the year 1903 must be charged the interruption of a great amount of business, but it must also be credited with the correction of certain evils which threatened to work far greater havoc if allowed to run their natural course. The setback to business can be taken as but temporary, since the condition of the country down at the root remained sound, and a large amount of the work withheld was in connection with great engineering and mechanical projects which had already attained a momentum which must carry them to completion before a great while. The correction of evils then existing worked, however, for lasting profit. In the first place, the unwise aggressiveness of labor was checked at a point where it had already become a menace to good industrial conditions. So far as the building trades were concerned the line had been overstepped, and the organization of employers to combat the unreasonable demands of the unions precipitated a struggle which was directly responsible for the abandonment of a large amount of work. The indirect effects were felt, however, in practically all lines of the mechanical trades. In the machinery industry the employers had previously been fairly well organized, and this fact, coupled with the disastrous effects witnessed in the building trades, restrained the machinists from uniting in any considerable outbreak.

The Labor Situation.

The new year finds labor in a more reasonable frame of mind, and the great American public has a keener sense of appreciation of the employer's rights and the abuse to which he is often subjected by militant unionism.

Business has been going at a pace said by the economists to be unsafe. There was a general belief that the creation of new securities and the expansion of existing issues had been carried to excess. On all sides it was admitted that values had gone too high and that they were still soaring. Production in all lines of industry was increasing at an enormous rate. It was seen that unless a halt was called a grand collapse carrying everything to the very bottom was inevitable.

The year 1903 must be given the credit for calling this halt and forcing these undertakings toward their normal level. This was accomplished, however, without the creation of a panicky state of affairs, disturbing the foundations of the business structure of the country. Of course Wall Street went to the extreme and the good and bad suffered alike. That everything in Wall Street is not good was plainly shown by some of the testimony adduced through the airing of the methods employed in the formation of one of the big consolidations. This showed the willful departure from business methods in "high financiering," and must surely serve as a lesson for the future.

In looking into the new year there are two matters which offer excuse for apprehension. They are the possibility of a breaking of the war clouds hovering about the East and the chances of a hot Presidential contest. These will offer basis for the pessimists to found argument upon. Their outcome is still pure conjecture. The optimist has a far greater array of subjects to stand upon. He can review the numerous large projects which have been so persistently held in abeyance and feel that the severance of the tethers which stay them, and which seem to be strained to the limit, will quickly bring on another avalanche of business.

In view of the magnitude of many of them, it would be interesting to scan the list, picking out the most important.

What will doubtless prove the largest single channel of machinery consumption will be the construction of the Panama Canal. While this cannot be termed a project of the ensuing year, as the great bulk of the work will be carried on in later years, yet it is generally believed that 1904 will see the matter definitely shaped, and perhaps the contract for construction awarded. The accepted opinion is that the Government will let contracts for the actual work of excavation. It is estimated that more than $10,000,000 will be expended for machinery and equipment. The machinery now on the site is practically worthless, and, at best, antiquated in design. Machinery merchants are of the opinion that considerable special machinery will be devised for the work, built somewhat on the lines of the great cantilever cranes or machines which made the construction of the Chicago Drainage Canal practicable.

Machinery for the Panama Canal.

Naturally there will be a vast amount of smaller machinery of standard types, such as dredges, steam shovels, pumps, scrapers, engines and boilers of various types, air compressors, rock drills, crushers, concrete mixers, hoists, electric and refrigerating plants, and, of course, fully equipped machine shops. Considerable speculation is being indulged in as to the *personnel* of the commission to be appointed to supervise the execution of the work.

Another canal project, which has aroused a good deal of attention, is the enlargement of the Erie Canal crossing New York State. There is scarcely any room for doubt that the contracts for this work and the requisite machinery will be awarded this year.

So much has been said about the Pennsylvania Tunnel scheme, which includes the undermining of the North and East rivers and the island of Manhattan, that it is scarcely necessary to recall it. It has progressed so far that it certainly looks as though the commencement of it must form a part of the history of 1904. Here large sums must be expended for machinery.

Somewhat akin to this is the plan of the New York Central system for the electrification of their New York terminal. Large quantities of machinery have already been contracted for in this connection, but a considerable amount still remains to be purchased during the new year.

Another tunnel scheme which will come up in an active form is that of the Hudson & Manhattan Railroad Company, who recently obtained a franchise to tunnel the North River, from Exchange place, Jersey City, to Cortlandt street, Manhattan. This is the company of which William G. McAdoo is president. Charles M. Jacobs, who is chief engineer for the Pennsylvania Railroad Tunnel, is also connected with this company in a similar capacity.

Large Projected Power Stations.

As an important section of these projects is the construction of large power stations, the mind naturally reverts to similar projects in and about New York. It is well known that the New York Edison Company intend extending their generating capacity very materially during this year. There is every indication that some very substantial orders for power station equipment will be placed by this company in the very near future.

The Brooklyn Rapid Transit Company are also on the verge of placing orders for a new station of something like 150,000 horse-power. The system is sorely in need of additional power and improved facilities, and, in fact, this matter has lagged so long that the need at present is imperative.

A 40,000 horse-power hydraulic power development, in which New York capitalists are interested, and which will doubtless attract attention during the year, is to be located on the Susquehanna River and furnish electric power to the city of Baltimore and nearby towns.

There is little doubt that the specifications for new machinery to be issued by the railroads this year will be heavy. Last year witnessed marked activity in the erection of new shops and the enlargement of old ones.

In many instances the construction work on the buildings was interrupted by strikes, and other appropriations for machinery were withheld for various reasons, and as a result there are numerous new or improved railroad shops either completed or nearly so which are sorely in need of machinery equipment. As it is the usual custom among the various roads to make annual appropriations for the various departments in the spring, there is good basis for hope that a great amount of this needed machinery will be purchased within a few months. A noticeable feature of the shop extensions of the large systems is that they are drifting toward a state where they will be practically independent of the locomotive and car building companies.

New Railroad Shops.

For the equipment of the many shops which the Pennsylvania Company are constructing and have projected along their lines, very little machinery was purchased during the latter portion of last year. It will be recalled that extensive shops are under construction for Fairview, opposite Harrisburg, Pa. It is estimated that the buildings alone will cost about $500,000. New wheel shops and a large foundry are being built at Burket's Station, near Altoona, Pa., the principal building to be over 600 feet long. Extensive shops are planned for Trenton, N. J., where a large site was purchased last year, and at Wilmington, Del., the new shops in connection with the Philadelphia, Baltimore and Washington line need a large amount of equipment. These are simply the very prominent points connected with the shop extension plan of this system which it appears actually require immediate action as to equipment this spring.

The purchases which the Erie made during the latter half of the year are said to be but a small portion of what is planned in the way of the improvement of the shop system of this road. It will be recalled that $10,000,000 was appropriated last summer for improvements on the Erie.

A similar amount was likewise appropriated by the Union Pacific Railroad Company, and there is said to be an elaborate scheme afoot for shop extensions.

The large new shops under way at Sayre, Pa., for the Lehigh Valley Railroad have not been provided for as to machine tools, although the traveling cranes, engines and boilers were purchased a short time ago. In this case the locomotive shop, the largest of the series, is to be 366 x 750 feet.

For their new Keyser Valley shops, the Lackawanna Railroad will be in the market for an elaborate machinery equipment. The buildings are being erected at a cost of some $750,000, and the principal purpose of the shops is the building of freight cars. This company also have intentions of building locomotives at this point eventually.

Complete Modernization of Shops.

The New York Central, or Vanderbilt systems, it is expected, will prove excellent customers as a result of their decision to modernize all of their shops and standardize all of their equipment, track materials, &c. It will be recalled that J. F. Deems was made general superintendent of motive power, rolling stock and machinery last year, with a view of carrying out this plan. He has spent a great deal of his time visiting the various shops along the system and small changes have been made from time to time, but the work has only fairly begun.

Only a small portion of the intended equipment has been purchased by the Southern Railway. They are erecting new shops at Knoxville and Spencer, but the directors have so far deferred the appropriations for the necessary machinery. Specifications were issued several months ago for machine tools covering the equipment of five large shops. A little over $50,000 worth of the tools was purchased at that time.

The Seaboard Air Line also have a large machinery proposition, which was deferred until this year. Their plan is to establish a system of repair and car and locomotive building shops at Atlanta, Ga., capable of taking care of their entire line. It has been stated that this matter will not be up to the purchasing point much before next summer or fall.

The Chesapeake & Ohio have a project for the establishment of new shops at Clifton Forge, Va. This is said to be another case of holding back for the 1904 appropriation.

The Louisville & Nashville also have a very extensive shop scheme on their hands. They are to be located at Louisville, and work on the buildings was started recently.

The Pittsburgh, Shawmut & Northern Railroad of Olean, N. Y., are looking for a site for new shops.

Great shops are to be erected at Allendale, Ontario, Canada, by the Grand Trunk Railway System, which will require a large amount of new equipment.

The Wabash Railroad are also to build shops in Canada, and J. B. Barnes, superintendent of motive power and machinery, Springfield, Ill., is preparing the plans.

The Denver & Rio Grande Railroad System are to enlarge their shops at Salt Lake City, Utah, expending some $200,000. Robert L. Langton of Denver, Col., is the company's mechanical engineer in charge.

Wm. O. Herin, superintendent of machinery and equipment of the Missouri, Kansas & Texas Railway System, located at Parsons, Kan., has prepared extensive plans for the enlargement of the shops at Parsons. This is a matter scheduled to come up for decision early this year.

It will be recalled that the rebuilding of the large shops of the Père Marquette Railroad Company, at Saginaw, Mich., was deferred until next spring.

Closely allied to railroad work is the large project of the Armour Car Lines of Chicago, which is now under way. This is the construction of a complete shop system for the building of cars.

Another car plant for which a great deal of machinery will be purchased very shortly will be built at Henderson, Ky., by the newly formed Henderson Car Works Company of that city.

The Central Car & Foundry Company intend expending $200,000 on a car building plant at Vincennes, Ind., having a production of 25 finished cars and 15 repaired cars a day.

Extensions of Electrical Apparatus Works.

In the field of manufacture of electrical apparatus there will doubtless be large opportunities for the sale of machinery during the next 12 months. This industry has been especially favored in recent years and seems to enjoy a degree of prosperity all its own, even at times when the general machinery trade shows signs of dullness. This is doubtless due in a large measure to the constant widening and development of its field. The remarkable feature of 1903 in this respect was the advancement of the turbo-generator. Its great success from a commercial standpoint has forced the large electrical companies producing it to tax all their resources to their utmost limit to even attempt to supply the demand. Enormous plant extensions were planned, and some of them were put through, while much the greater portion has remained over for this year to cope with. Both of the great interests of this country need machinery to complete enlargements already begun. They need a great deal of it and need it badly.

The General Electric Company have tremendous buildings about completed at both Lynn and Schenectady, but have not as yet ordered the necessary mechanical equipment for them. They have been in the market with fat lists, received bids, but refrained from making the purchases. Just before the close of last year they became recipients of the big contracts awarded by the New York Central interests, and these, it is thought, will so tax their capacity in connection with their regular business that the long delayed machinery contracts will be forthcoming before the new year has grown very old.

The Westinghouse Electric & Mfg. Company are doubling the size of their great plant. They have come into the market at various times within the last few months and taken small quantities of machinery, but the greater part of the equipment is still to be secured. Just before the eve of the old year announcement was made of the intention of establishing a Canadian Westinghouse Company, and immediately following this came the word that the Westinghouse Machine Company of

Pittsburgh had acquired from C. A. Parsons the full rights to manufacture in the United States and Canada the Parsons type of steam turbines for all purposes. Coupled with this was the announcement that a special department would be organized for the introduction of the marine type of turbine, in order to more effectively promote its use upon all classes of vessels, including all types of war ships.

The Bullock Company also prepared an invasion into Canada last year, and are erecting excellent works there. They also enlarged their Cincinnati plant, and to replace a building recently destroyed by fire will erect a large addition to the plant, equipping it with the most modern machinery.

Requirements for Other Industrial Plants.

The enormous new plant of the International Steam Pump Company at Harrison, N. J., is now about under roof, and new machinery will shortly be purchased to add to that to be moved from the present Worthington plants. Some idea of the size of this plant can be formed when it is considered that the main machine shop is 1006 feet long, and a number of other buildings, each capable of containing a good sized plant of themselves, surround it. Twenty-seven electric traveling cranes, ranging in capacity from 5 to 50 tons, will be among the requirements for fitting out these works.

A large amount of new machinery is still required by the Ingersoll-Sargeant Drill Company for their great new shops at Phillipsburg, N. J. The machine tools purchased thus far have been of the smaller types.

The Lidgerwood Mfg. Company have their new plant at Newark, N. J., under way, and will install many thousands of dollars' worth of machinery in it during this year.

The Singer Mfg. Company of Elizabethport, N. J., have just placed in operation rolling mills to supply their own wants in this direction, and are also operating their own iron property at Stanhope, N. J. The latest report in connection with this company has it that they are about to erect a large plant near Montreal, Canada, for the production of their line of sewing machines. They are now completing a large plant in Germany.

A large amount of machinery will be required by the reorganized Ferracute Machine Company of Bridgeton, N. J., in the rebuilding of their plant, which was recently destroyed by fire. Oberlin Smith, the president of the company, is using every effort in planning for the immediate erection of a most modern machine works.

Extensive purchases will soon be made by Richey, Brown & Donald, of Long Island City, New York, who will rebuild their large plant, which was entirely wiped out by fire a short time ago.

The Eastern Steel Company, of Pottsville, Pa., are about to extend their plant considerably and will expend about $1,000,000 early this year for the necessary equipment, &c.

The new United Lead Company and their constituent concerns will spend considerable money on new plants and improving their existing works. At Granite City, Ill., a large plant will be erected for the manufacture of lead in all forms, as well as lead products, such as pipe, sheet, plumbers' goods, &c.

Of course there are many, many more projects in a similar status to those enumerated above, but in these mentioned there is ample evidence of a goodly share of unfinished business which the new year finds itself heir to.

The Supreme Court of Pennsylvania has handed down an opinion in which it holds that the act of the Legislature of 1891 providing that foreign corporations engaged in business in Pennsylvania shall pay to the commonwealth a bonus of one-third of one per cent. upon the amount of their capitalization does not apply to corporations in business in the State prior to the passage of the act. The decision upholds a judgment of the Harrisburg courts, which held that the Danville Bessemer Steel Company, the Crucible Steel Company of America and the American Steel & Wire Company of New Jersey need not pay the bonus.

PERSONAL.

A. E. Rosenthal, who has been a dealer in iron and steel in Chicago for 11 years, has accepted the position of general sales manager of the Davenport Locomotive Works, and has removed with his family to Davenport, Iowa.

E. Stuetz of New York will lecture on alumino thermics at the Franklin Institute, Philadelphia, on January 20, and at the Massachusetts Institute of Technology, Boston, on February 26.

Paul L. Wolfel, chief engineer of the American Bridge Company, announces the following appointments: James H. Edwards, assistant chief engineer, in charge of building construction, Ambridge, Pa.; C. G. Emil Larsson, assistant chief engineer in charge of bridge construction, Ambridge, Pa.; Richard Khuen, resident engineer, Ambridge, Pa., and Albert Reichmann, resident engineer, Monadnock Block, Chicago, Ill. The offices of division engineer at Pencoyd, Pa., and Pittsburgh, Pa., are abolished. The estimating and designing forces heretofore maintained at Pencoyd, Pa., and Pittsburgh, Pa., have been transferred to Ambridge, Pa.

D. B. Wentz, until recently general manager of the Stonega Coke & Coal Company, of Big Stone Gap, Va., has become vice-president, with headquarters at Philadelphia. His successor as general manager is A. H. Reeder, who has resigned the position of general manager of the Crow's Nest Pass Company.

William M. Carr has severed his connection as chief chemist and metallurgist for the St. Louis district of the American Steel Foundries Company.

Arthur J. Herschmann has established himself at 45 Broadway, New York, as a consulting engineer, making a specialty of heating, lighting and ventilating plants.

Charles M. Schwab expects to sail for Europe for a prolonged stay in about a fortnight.

Albert H. Hammacher, son of the senior of Hammacher, Delius & Co. of New York, has been admitted to the firm.

Manager Harry G. Stoddard of the Worcester Works of the American Steel & Wire Company, who has been ill for some weeks, is at his office again, in full possession of his former excellent health.

A. E. Corbin, district organizer of the National Metal Trades Association for the first district, has been engaged by the newly organized Springfield, Mass., Metal Trades Association as secretary, to have active charge of the association's work, including the labor bureau, the work of which has already begun.

Arthur A. Fowler, for some years the head of the extensive grain commission firm of A. A. Fowler & Co., Produce Exchange, New York, has been admitted to the firm of Rogers, Brown & Co., pig iron merchants, and will join the New York organization of the firm, at 71 Broadway.

C. W. Bray, formerly chief engineer of the American Tin Plate Company, has been made chief engineer of the American Sheet & Tin Plate Company, and Sumner B. Ely will be his assistant.

George W. Parsons, who, for a long term of years, has managed the business of the frog, switch and signal department of the Pennsylvania Steel Company, has retired from active service and will retain his connection with the company in an advisory capacity. C. W. Reinoehl, long connected with the Pennsylvania Steel Company, succeeds Mr. Parsons as superintendent of the department; W. C. Cuntz succeeds Mr. Reinoehl as sales agent in charge of the Steelton (Pa.) sales office.

S. P. McConnell has resigned the presidency of the George A. Fuller Company, a subsidiary of the United States Realty and Construction Company.

B. F. Harper has resigned from the Republic Iron & Steel Company, and has accepted a position as special agent for the Carnegie Steel Company, with headquarters for the present at the Cleveland office. He will work directly under H. P. Bope, general manager of sales, Pittsburg, but in conjunction with all local agencies in the territories in which he will operate.

MANUFACTURING.

Iron and Steel.

Genesee Furnace Charlotte, N. Y., was blown out December 11.

George L. Reis, general manager of the Lackawanna Steel Company, announces that the blast furnace and four coke oven batteries of that company at Cornwall and Colebrook, Pa., will be put in operation during the coming spring. By April all of the pig now stored at Cornwall and Colebrook will have been shipped to Buffalo, N. Y.

The Pennsylvania Steel Company, Steelton, Pa., have started fire in their No. 4 blast furnace and will put it in blast within the next few days. The company's furnace at Lochiel will also be put in blast within the next week, after having been off for repairs for several months. The rail mill and blooming mills will resume operations after a shutdown of more than a week.

The Altoona Iron Company's rolling mills at Altoona, Pa., have resumed operations after a month's idleness, with orders sufficient to keep them going during the remainder of the winter.

Belmont Furnace of the Wheeling Steel & Iron Company, Wheeling, W. Va., was banked December 10.

Toledo Furnace, Toledo, Ohio, was blown in December 29.

Chatham Furnace, Chatham, N. Y., is expected to be blown in this week.

Woodstock Furnace of the Woodstock Iron Company, Anniston, Ala., was blown out December 18.

West End Furnace, Roanoke, Va., has blown out.

The Graham Iron Company blew in their Graham Furnace, at Graham, Va., December 26.

Rockhill Furnace, Huntington County, Pa., was blown in December 19.

Olive Furnace, Lawrence County, Pa., was blown in December 30.

Mabel Furnace, Sharpsville, Pa., has blown out temporarily.

Etna Furnace of the Marting Iron & Steel Company, Ironton, Ohio, will blow in about January 7.

Union Furnace of the Union Iron & Steel Company, Ironton, Ohio, is out for repairs.

Stockholders of the United States Steel Company, Everett, Mass., have petitioned the court to appoint a receiver for the company on the ground of insolvency.

The Chesapeake Nail Works of Harrisburg, Pa., resumed operations on Monday of this week after a long shut down.

After having been idle for several weeks, the puddle mill of Howe & Samuel and the structural iron works at Danville, Pa., have resumed operations.

The National Tube Company's works at Middletown, Pa., have been closed for an indefinite period. Notices have been posted to the effect that there will be a readjustment of wages upon the resumption of work.

With the beginning of the new year the Lorain Steel Company of Ohio passed out of existence and became a part of the National Tube Company. The Lorain Steel Company of Pennsylvania, with plants at Johnstown, Pa., remain intact, however, and with a number of official changes will continue to do business as heretofore. The headquarters of the Pennsylvania company will continue in Philadelphia.

We are officially advised that the Shenango Valley Bessemer plant of the Carnegie Steel Company, at New Castle, Pa., will resume operations about January 15. The plant has been idle for about three months, during which time extensive repairs and additions have been made.

It is the intention to start up the South Sharon blooming mill of the Carnegie Steel Company, at South Sharon, Pa., on January 11, to work up several thousand tons of ingots now on hand at this plant. Further operations of this plant will depend altogether on future conditions and developments. It is also the intention of the American Steel & Wire Company, who operate the rod, wire and wire nail departments of these works, to start them about January 15.

The Railway Steel Spring Company are making extensive improvements to their plant at Oswego, N. Y., which, it is thought, will necessitate the installation of considerable new machinery. The new building is about 215 x 340 feet, and is being built directly over and around the original plant without interrupting manufacturing operations. It is expected that the work in all its details will be completed February 1.

Several departments of the Colorado Fuel & Iron Company, Pueblo, Col., have resumed operations, and it is expected that the wire mill will be started up early this month.

It is expected that the Glasgow Iron Company, Pottstown, Pa., will rebuild their plate mills, which were recently destroyed by fire, as soon as the insurance is adjusted.

The Columbus Iron & Steel Company, Columbus, Ohio, have increased their capital stock to provide for the iron ore and coking coal interests acquired during the past year. They do not contemplate making any extensions to their works.

Anna Furnace, at Struthers, Ohio, was blown out December 12.

No. 2 stack of the Sheffield Furnaces, at Sheffield, Ala., was blown out December 13, leaving only one of the three furnaces at that point in blast.

The American Steel & Wire Company's factory at Anderson, Ind., is being made ready to resume operation in full. The plant has been closed most of the time for eight months while extensive improvements have been made, which will double its capacity. It will now give employment to about 1000 men. The promise is for a long run.

General Machinery.

The machine shop business of John Waldron, New Brunswick, N. J., has been incorporated as the John Waldron Company, with a capital stock of $30,000. The business will be continued under the same management as heretofore.

The Harrell Stamp Mill Company, El Paso, Texas, have been incorporated with a capital stock of $50,000, for the manufacture of Harrell stamp mills and crushers. It is their intention to erect a plant in the near future, but for the present they are having their machines made at the plants of the El Paso Foundry & Machine Company, El Paso, Texas, and the American Engineering & Foundry Company, Los Angeles, Cal. J. J. Harrell is president.

The Railway & Electric Equipment Company, Buffalo, N. Y., dealers in railway and electric equipment, were recently incorporated. Ellwood C. Jackson of Philadelphia, formerly of the Jackson & Sharpe Car Company, Wilmington, Del., is president; C. A. Ralston of Chicago is first vice-president; Frank J. Lewis of Cleveland, second vice-president; Charles F. Johnson of Buffalo, treasurer and general manager, and Robert W. Day of Buffalo, secretary.

The Steel Car Forge Company have resumed operations at their plant, in Ellwood City, Pa., after being closed two months or more on account of a lack of orders. The resumption was at a 10 per cent. wage reduction.

The Putnam Machine Company, Fitchburg, Mass., are making extensive improvements to their plant, in addition to those outlined in these columns some time ago. All of the six spaces between the ells of the main building have been covered with monitor roofs, each space affording an additional floor space of 40 x 60 feet. Translucent fabric is used for lighting the monitors, a year's test of the fabric having found it durable. Additions to the machine equipment are being made, and a traveling crane is yet to be installed in one of the new rooms made by roofing in a space between ells. The company's works are very busy.

The Empire Forge & Iron Company have been incorporated at Buffalo, N. Y., with a capitalization of $5000. The directors are George W. Pfohl, Frederick Kraebel, Robt. F. Kreinheder and Frederick G. Langner of Buffalo and Wm. Brennan, Jr., of Sloan, N. Y.

The Pusilion Tool Company, Buffalo, N. Y., have been declared bankrupt, and Allen N. McNabb has been appointed trustee for the creditors.

The George B. Sennett Company, Youngstown, Ohio, who for the past three years have been building a line of punching and shearing machinery for the Reade Machinery Company, Cleveland, have recently purchased from the latter their patterns and drawings, and will hereafter sell their product of punching and shearing machinery direct to the trade.

Exclusive of the motors with which it has been decided to equip the plant, it has not yet been decided just what machinery will be installed in the new repair shop to be erected on 138th street by the American Express Company, 65 Broadway, New York. Considerable iron and wood working tools will be required, however, as the shop is to be fitted out for making all repairs to the wagons. Each machine is to be operated by an independent motor, the electric current to be supplied by the New York Edison Company. The building will be 74 x 111 feet and will cost upward of $60,000. Charles W. Romeyn, 55 Broadway, is the architect.

Power Plant Equipment.

The Antigo Light, Heat & Power Company have incorporated at Antigo, Wis., to furnish heat, light and power. The capital stock is $50,000, and the incorporators W. L. Elliott, C. T. Mortenson and F. C. Duchac.

The Indiana State University, at Bloomington, Ind., will erect a power plant, 50 x 100 feet, of brick and stone construction, which will cost $20,000.

The Warren Steam Pump Company, Warren, Mass., have been awarded the contract for the pumps for the power station of the Intramural Railroad at the St. Louis Exposition. They will constitute the pumping outfit for 5000 horse-power boilers. Four pumps will be installed.

The Slater Woolen Company, Webster, Mass., are to install turbine engines, aggregating 700 horse-power, to provide power for the large additions to be erected the coming spring, plans for which are now being made. The engines will drive 400-kw. generators, to provide electric power to run motors, the new part of the works to be operated in large electric units.

The details of the boiler plant, which will provide steam for other purposes as well as for power, have not been determined. The improvements will cost close to $500,000.

Foundries.

The Gresham Planing Mill Company, Griffin, Ga., have installed a foundry and are now in position to make castings of all descriptions.

The Wayne Iron Works, Wayne, Pa., manufacturers of iron fences, contemplate the erection of a two-story addition to their plant, 50 feet square.

The Ellwood Foundry Company, who have had their plant at Ellwood City, Pa., closed down for some time, have now nearly enough orders on hand to keep them running until summer and they will shortly resume operations.

The Southern Foundry Company have incorporated at Dallas, Texas, to do a general foundry and repair business. J. B. Adoue, C. Robertson and S. W. Hardwick are the incorporators. The capitalization of the company is $3000.

The South Bend Foundry Company, South Bend, Ind., have completed their new plant. The building is 60 x 302 feet, constructed of brick and steel, and will be equipped with modern machinery, including an electric trolley system for handling heavy castings. It will have a capacity of 6 tons per hour.

Fires.

A recent fire destroyed James W. Carr's foundry at Richmond, Va., entailing a loss of $20,000.

The foundry of the Altman-Taylor Company, Mansfield, Ohio, was recently damaged $10,000 by fire.

The factory of the Knott & Pope Shoe Company, Hudson, Mass., was damaged $50,000 by fire January 2.

The works of the Morning Star Mfg. Company, Napoleon, Ohio, manufacturers of threshers and engines, were destroyed by fire January 1. The loss is placed at $80,000.

Hardware.

On New Year's Eve, at the factories of the Iron Clad Mfg. Company, Brooklyn, N. Y., every employee who had been in the service of the company during 1903 was presented with a basket filled with all the requirements of a good dinner. At these works are employed, we are informed, about 1000 people in the production of galvanized and enameled ware, range boilers and dairy supplies.

The Warner Fence Company, with factories at Waverly and Melvern, Kan., and at Muncie, Ind., purpose the consolidation of the three plants at Ottawa, Kan., in the natural gas belt.

St. Louis Wire & Iron Company, 518-522 Chouteau avenue, St. Louis, manufacturers of and dealers in builders' iron and wire work, have incorporated with a capital of $7000, fully paid in. The incorporators are Reinhold Tiesler, Ferdinand P. Laclerq and Eugene E. Semitt.

American Plow Company, incorporated some time since with a capital stock of $200,000, have commenced operations at Madison, Wis. Their plant consists of a blacksmith shop, 50 x 144 feet; warehouse, 54 x 80 feet; paint shop, 44 x 50 feet; steel storage room, 30 x 90 feet, and power plant, 30 x 108 feet. The plant has a capacity of 100 plows daily. On one side of the works is the St. Paul road and on the other the Northwestern, affording excellent railroad facilities. The officers of the company are James Barclay, formerly treasurer and superintendent of Deere & Co. and later superintendent of the J. I. Case Plow Works, president; Geo. D. Foster, vice-president; A. E. Johnson, secretary, and Jackson Reuber, treasurer.

The plant of the Pennsylvania Shovel Works, Corry, Pa., was destroyed by fire on the 1st inst. The loss is partly covered by insurance. We understand that the works will be rebuilt.

Miscellaneous.

The Schubert Bros. Gear Company, Oneida, N. Y., manufacturers of gears, buggies, wagons, &c., will materially enlarge their plant. It is intended either to erect an entirely new plant, 50 x 250 feet, three stories high, or build an addition to the present works, 50 x 140 feet, four stories high, besides boiler and engine house.

The Motor Traction Company, Spokane, Wash., will erect a plant in the spring for the manufacture of steam wagons for light and heavy work, and which will be operated by steam generated by crude oil. Plans are not completed, and it is not yet known just what machinery will be required. All communications should be addressed to B. W. Wolverton, treasurer. L. Rhodes is president and A. E. Gallagher, secretary.

The Phillips Pressed Steel Company, Joliet, Ill., have increased their capital stock from $25,000 to $50,000.

F. E. Came, Montreal, P. Q., is rebuilding his railway supply plant, which was recently destroyed by fire. The new building will be the same size as the old, 80 x 400 feet. Most of the machinery was not injured.

Boll Bros., Harrisburg, Pa., whose plant was destroyed by fire some time ago, have leased temporary quarters until the completion of their new building, in order to fill many outstanding orders for brass beds and steel mattresses. The company will rebuild on an enlarged and improved scale. Work on the new building will be commenced as soon as weather conditions permit.

The American Radiator Company, Chicago, have entered into a contract with the city of Litchfield, Ill., whereby the company are to build a large steel and brick plant, at a cost of $150,000.

The Centaur Motor Company, Buffalo, N. Y., will at once erect a two-story brick factory and storage building on Franklin street.

The Gustin-Bond Axle Company have been incorporated at Sullivan, Ind., with $25,000 capital stock. The directors are Gilbert Bond, Mahlon R. Gustin, Wm. J. Hamilton and Walter A. Ford.

The Central Car & Foundry Company, who are to erect a plant at Vincennes, Ind., have been incorporated with $45,000 capital. The directors are Joseph R. Kavanagh, H. E. Frazier, Otto Winkenhofer and Charles G. Mueller.

The plant of the Richmond Plow Company of Richmond, Ind., has been sold to the Brown-Manley Agricultural Company of Malta, Ohio. The concern were the first in the West to manufacture steel plows, having started 65 years ago.

N. O. Davis has been appointed receiver for the Hoke Mfg. Company, Frankfort, Ind., on application of one of the banks of that city. The company manufacture farm implements. They moved to their present location from South Bend, Ind., two years ago. The assets are placed at $60,000 and liabilities at $20,000. The receiver is of opinion that a settlement will be made and the plant soon started up again.

Labor Notes.

The National Wire Corporation of New Haven, Conn., have notified their employees of an 11 per cent. decrease in wages, beginning with the new year. The reduction applies very generally to the various departments of the company's works.

Announcement is made of a reduction in wages at the shops of the Charlestown Navy Yard. The lower grades of labor get a reduction from $2 to $1.84 a day, and other classes are proportionately affected. The cut down is the result of a report by the Board of Wages, consisting of the heads of the various departments of the yards, which decides each six months what the wages for the next half year shall be.

The Lorain Steel Company, with a plant at Johnstown, Pa., have reduced the wages of all employees on an average of 10 cents per day, which puts the men on the same basis they were before the voluntary wage advance of a year and a half ago.

The employees of the Ellwood City seamless tube mills, which are the property of the United States Steel Corporation, have been notified of a 10 per cent. reduction in wages, effective January 4.

At the Labelle Iron Works, Steubenville, Ohio, where a general wage reduction of 30 per cent. was proposed when the open hearth department is reopened, the workmen have rejected the proposition.

At Indianapolis, on December 30, Judge Carter of the State Supreme Court granted a temporary injunction against union iron molders who have been active in the trouble at the works of the Indianapolis Foundry Company, arising from the strike inaugurated last May. The injunction was made to apply to the business agent of the local union organizations, and about 20 other individual members who, as shown by the evidence, were especially active as "strike workers, pickets and the like." It orders them from "in any manner" engaging in any action which could be construed as "interfering with, hindering or obstructing the company's business."

The Worcester, Mass., Labor Bureau, operated by the Worcester Metal Trades Association, has been widening the scope of its work. The builders' finish men and the electrical contractors of the city have become subscribers, and other lines of employment are interested and will probably join later on. Even retail merchants have asked to be taken in as subscribers. They do not become members of the association, but simply customers of the labor bureau.

The Iron and Metal Trades.

There has been increased interest in the Foundry Pig Iron markets, the situation having undergone a change in some respects. While the Southern makers have practically withdrawn from the market and are asking $10 for No. 2 Foundry, Birmingham, there has been some disposition on the part of Northern producers to shade prices. They have been encouraged in this because of the lowering of cost, new contracts on a much lower basis having been closed for Coke. In the Eastern sections wages are lower, although that in itself does not cut much of a figure. The result is that the Northern furnaces are taking what business is offering. Thus at Lake Erie points No. 2 is selling at close to $13.50, while Valley furnaces are quoting $13.

The Southern makers held a series of meetings which, however, have not led to any tangible results.

Disquieting reports come from the Steel Rail trade, which must, however, lose a good deal of their force when the conditions are more carefully examined. It is stated that some of the railroads have recently canceled orders placed for this year, that others have cut down their estimates, and have notified the mills of postponement of deliveries, and that earlier inquiries have shrunken much lately. All this must not be taken too seriously. The buyers know that the Steel Rail capacity is much greater now than it was a year ago, that the pressure for Steel for the manufacture of Billets is less, and that therefore, in all probability, there will be little trouble, at any time during 1904 in securing fair deliveries. There is little incentive therefore to get orders in early, or to put in full requirements. Prices are usually guaranteed against a decline, but this applies only to the actual time of shipment. When Rails are delivered the contract price holds.

In Finished Iron and Steel generally consumers are maintaining a waiting attitude. Some tonnage has been placed in Structural Material, but there are reports that some low prices are being made in fabricated material and on contracts for finished structures. There have been complaints, too, of occasional irregularities in the Plate trade. In the East and in the West Iron Bars have not gained in strength, but a better volume of inquiries is reported in Sheets. An export trade in Bars is developing in an encouraging manner.

There is a little better feeling in some branches of the trade in Old Material, although the sale of about 4000 tons of Low Phosphorus Scrap by a very large steel works some weeks since was a wet blanket on the market. Some of the January lists of the railroads are pretty long and show quite a heavy tonnage. On the other hand, further sales of Old Material, both to England and to Italy, are pending and are likely to go through.

Some good contracts for Coke have been placed during the week at prices at the level of about that ruling lately—viz., a shade under $1.50 for Standard Connellsville, at oven.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Jan. 7, 1904.	Dec. 30, 1903.	Dec. 9, 1903.	Jan. 8, 1903.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	*$14.75*	$15.00	$15.00	$22.75
Foundry Pig No. 2, Southern, Cincinnati	12.00	12.00	12.00	21.75
Foundry Pig No. 2, Local, Chicago	**14.50**	14.50	14.25	23.00
Bessemer Pig, Pittsburgh	*14.10*	14.10	14.60	21.85
Gray Forge, Pittsburgh	**13.00**	13.00	12.60	20.00
Lake Superior Charcoal, Chicago	**16.75**	16.75	16.50	25.00
BILLETS, RAILS, &c.:				
Steel Billets, Pittsburgh	23.00	23.00	23.00	29.50
Steel Billets, Philadelphia	24.25	24.25	24.25	27.00
Steel Billets, Chicago	24.00	24.00	24.00	29.50
Wire Rods, Pittsburgh	*30.00*	30.00	31.00	34.50
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	*9.00*	9.50	10.75	18.75
O. Steel Rails, Philadelphia	*11.50*	11.50	11.75	21.00
O. Iron Rails, Chicago	13.00	13.00	13.00	24.00
O. Iron Rails, Philadelphia	16.00	14.50	16.00	24.00
O. Car Wheels, Chicago	13.00	13.00	13.00	24.00
O. Car Wheels, Philadelphia	12.75	12.75	12.75	20.00
Heavy Steel Scrap, Pittsburgh	11.00	11.00	11.00	21.50
Heavy Steel Scrap, Chicago	**10.00**	9.50	9.00	18.25
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.35	1.35	1.35	1.92
Common Iron Bars, Chicago	*1.30*	1.30	1.35	1.75
Common Iron Bars, Pittsburgh	1.34¾	1.34¾	1.34⅜	1.70
Steel Bars, Tidewater	1.44½	1.44½	1.44½	1.75
Steel Bars, Pittsburgh	1.30	1.30	1.30	1.60
Tank Plates, Tidewater	1.74½	1.74½	1.78	2.10
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.75
Beams, Tidewater	1.74½	1.74½	1.73½	1.90
Beams, Pittsburgh	1.60	1.60	1.60	2.00
Angles, Tidewater	1.74½	1.74½	1.73½	1.90
Angles, Pittsburgh	1.60	1.60	1.60	1.90
Skelp, Grooved Iron, Pittsburgh	**1.50**	1.50	1.45	1.90
Skelp, Sheared Iron, Pittsburgh	*1.50*	1.50	1.55	1.95
Sheets, No. 27, Pittsburgh	*2.25*	2.25	2.30	**2.65**
Barb Wire, f.o.b. Pittsburgh	*2.45*	2.45	2.50	**2.45**
Wire Nails, f.o.b. Pittsburgh	*1.85*	1.85	1.90	**1.85**
Cut Nails, f.o.b. Pittsburgh	1.90	1.90	1.90	2.05
METALS:				
Copper, New York	**12.37½**	12.37½	12.25	**11.87½**
Spelter, St. Louis	**4.75**	4.65	4.60	4.35
Lead, New York	**4.25**	4.25	4.10	4.10
Lead, St. Louis	**4.17½**	4.17½	4.02½	**3.97½**
Tin, New York	**29.00**	28.60	27.00	**26.50**
Antimony, Hallett, New York	6.25	6.25	6.25	**7.12½**
Nickel, New York	40.00	40.00	40.00	40.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.79	3.79	3.79	3.79

Chicago.

FISHER BUILDING, January 6, 1904.—(*By Telegraph.*)

The only marked changes in market conditions to report this week are an advance of 50c. per ton on all grades of Southern Pig Iron and a reduction in price made by an increase of from two to three points in discounts on Steel and Iron Pipe. The new year is opening up with somewhat of a better feeling, though the horror of the Iroquois Theater fire is still uppermost in men's minds and a topic of conversation that excludes business and all other considerations. Manufacturers, jobbers, wholesalers and retailers all report that their morning's mail for the first Monday in the year was greater than it had been for a long time, and that the inquiries and orders show a healthy awakening of interest among buyers. Pig Iron is now sold no lower than $10, Birmingham, for No. 2, or $13.85, Chicago, for the first quarter, with $14.50, Chicago, as a minimum on Northern No. 2. Representatives of one leading Southern interest report that their principals will not permit them to take orders for more than 500 tons to one customer at that price for delivery within the first quarter of the year. On every hand there is either an inclination to refuse to quote altogether on the second quarter or to quote 50c. to $1 per ton above the price set for the first three months. Bars are improved somewhat in demand, although there is still much room for betterment. Structural Materials show an awakening, and the Madison and Adams buildings were placed during the week. Plates have revived admirably and the representative of one Eastern mill reports 12 carloads placed in three days to 12 different customers, with a large volume of smaller orders. Boiler Tubes are a little more active than last week, as the reduction in prices then noted is making itself felt in a better demand on the part of buyers, who

have held off heretofore. Sheets show no changes in prices, though the demand is somewhat better than it has been. Cast Iron Pipe is moving more actively in the West, though leading interests here do not expect a general awakening until a month or two later, although a sharp advance in Pig Iron might stimulate anticipatory orders. Rails are still quiet, although some roads are making inquiries for considerable tonnage. The leading producer in the West took an order for 40,000 tons for delivery at Port Arthur, Canada, for the McKenzie-Mann Syndicate, for use on the right of way of the Canadian Northern Railway. Merchant Steel shows no change outside of a little more freedom in specifying and some new contracts of 500 to 1000 ton lots. Old Materials show advances in some items and reductions in others, though in general the feeling is a little stronger than a week ago.

Pig Iron.—Southern Pig Iron producers, although not now in a pool, are unanimous in refusing to sell Pig Iron for delivery in the first quarter of this year for less than a base price of $10, Birmingham, for No. 2, which is just $1 higher than the price of one month ago. Opinions differ as to the probable course of the market, some interests arguing that it will not be possible for the Southern producers to maintain this price unless they still further curtail production, while others insist that production is already far below the demand and that the inevitable tendency is upward, though no one expects the boom of last year. It is reported here that there has been an effort made recently to reorganize the Southern Iron Association, which played such an unhappy *rôle* in the market of last year, and that this proposition has thus far been made impossible by the determination of one large producer to remain independent. Buying between Christmas and New Year's Day was exceptionally heavy for that season of the year, as buyers were anxious to get under cover before the anticipated advance which has just taken place. Among the sales noted are 3000 tons of Northern Iron for a local melter on the basis of $14.50 for No. 2 Foundry, together with several lots of 1000 and 500 tons to foundrymen in Chicago, Milwaukee and other Western centers. One large Southern producer has instructed its representatives everywhere to take no orders larger than 500 tons from one melter for shipment within the first quarter at the basis of $10, Birmingham, for No. 2, and also instructed them to refrain as much as possible from quoting at any price for delivery beyond the first quarter. Others are selling for the second quarter on the basis of $10.50, Birmingham, for No. 2. The readjustment of labor and Coke costs on the part of Northern furnaces, together with the advance in the price of Southern Iron, is permitting the Northern furnaces to move a part of their large accumulation of stock. Only three furnaces are in blast to-day in this district, two Iroquois and one Thomas, with a furnace at Maysville, Wis., temporarily in blast. We reduce our prices on Alabama and Georgia Car Wheel and Jackson County and Kentucky Silvery $1 per ton as compared with last week's quotations, though it should not be considered that this cut of $1 per ton was made in one week, for the market has been only nominally as quoted for some time. In the following list of prices the low figures represent quotations for shipment for the first quarter and the high figures for later deliveries:

Lake Superior Charcoal	$16.75 to $17.25
Northern Coke Foundry, No. 1	15.00 to 15.50
Northern Coke Foundry, No. 2	14.50 to 15.00
Northern Coke Foundry, No. 3	14.00 to 14.50
Northern Scotch, No. 1	15.50 to 16.00
Ohio Strong Softeners, No. 1	16.80 to 17.30
Ohio Strong Softeners, No. 2	16.30 to 16.80
Southern Silvery, according to Silicon	15.35 to 16.35
Southern Coke, No. 1	14.35 to 14.85
Southern Coke, No. 2	13.85 to 14.35
Southern Coke, No. 3	13.35 to 13.85
Southern Coke, No. 4	12.85 to 13.35
Southern Coke, No 1 Soft	14.35 to 14.85
Southern Coke, No. 2 Soft	13.85 to 14.35
Foundry Forge	12.85 to 13.35
Southern Gray Forge	12.60 to 13.10
Southern Mottled	12.10 to 12.60
Alabama and Georgia Car Wheel	19.85 to 20.95
Malleable Bessemer	14.50 to 15.00
Standard Bessemer	16.30 to 16.80
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon	17.30 to 17.80
Basic Southern	14.35 to 14.85

Bars.—Bar Iron is still sold to some buyers as low as 1.30c., Chicago, and the demand seems to increase steadily with the general conclusion on the part of buyers that Steel will not be cut below its present figure. Steel Bars and Bands are held firm at 1.46½c., base, half extras, Chicago, in car lots, with orders coming in better for shipment from mill and from store. Hoops continue to be fairly active. We quote: Bar Iron, 1.30c. to 1.40c., base, half extras; Bar Steel, 1.46½c. to 1.51½c., base, half extras, with quarter extras for rounds and squares larger than base; Hoops, 1.81½c. to 1.91½c. rates, in carload lots, with 10c. advance for less than cars; Small Angles, Beams, Channels and Zees, 1.56½c. to 1.66½c., base, half extras; Small Tees, 5c. advance. Store business is improving, with Steel Bars selling at 1.60c. to 1.75c., the lower price being only for the large regular buyer. Iron bars from store are sold at the same price as Steel, Iron being sold on full card extras, with Steel at half extras. Store business on Hoops continues to be done at 2.10c. to 2.20c. rates, full extras.

Structural Material.—Steel for the Adams Building being erected by Colonel Strong, at Adams and State streets, and the Madison Building, at the corner of Madison and State streets, was placed with the American Bridge Company. The aggregate tonnage for the two buildings is 4050 tons of Structurals. The building department of the leading bridge company reports a renewed activity in every part of the country now that the cost of building is being somewhat reduced, because of the low prices quoted on brick and the concessions being made in both lumber and labor. Railroads are still comparatively inactive in buying for bridges and building, although car shops are buying in larger quantities than for two months. Structural Shapes are still quoted at 1.76½c., Chicago, for I-Beams and Channels up to and including 15 inches and for Angles 3 inches on one leg and over, with $1 per ton extra for Tees 3 inches and larger. Structurals offered from store at from 1.90c. to 2c., cut to lengths 5 feet and over. Large warehousemen are able to get the higher prices named on all ordinary lots, the lower prices named being only to meet competition on business of some magnitude.

Plates.—Large sales of Plates were made between Christmas and New Year's Day on the basis of 1.75c., Chicago, the association price for last year, before the new price, 1.76½c., went into effect. One mill agent reports that in three days he sent to his mill orders for immediate shipment of 12 cars to 12 different customers, with active less than carload buying on the part of many others. We quote: Tank Steel, ¼-inch and heavier, 1.76½c. to 1.86½c.; Flange, 1.86½c. to 1.96½c.; Marine, 1.96½c. to 2.06½c.; Universal Mill Plates, 1.76½c. to 1.86½c. Jobbers report the usual active cold weather selling of Boiler Plate, at 2c. for Tank quality, ¼ inch and heavier, with 10c. advance for 3-16 inch, 20c. for Nos. 8 and 10, and 25c. extra for Flange quality.

Boiler Tubes.—No reduction in price has yet been announced on the part of manufacturers of Seamless Steel Tubes in competition with the reduced prices quoted last week on Lap Welded Steel and Iron Tubes. As it is, Seamless Steel Tubes are selling for considerably less money than Lap welded Iron, and are preferred by many users to the Iron Tubes because of the ease with which the Seamless Steel Tube is beaded, expanded and welded. We quote the following discounts for carload lots, f.o.b. Chicago, in which 1.65 per cent. has been subtracted from the new Pittsburgh basing discount to take care of the 16½c. freight on carload lots of Boiler Tubes from Pittsburgh to Chicago:

	Discounts, per cent.		
	Steel.	Iron.	Seamless steel.
1 to 1½ inches	42.35	38.85	53.35
1¾ to 2¼ inches	54.85	37.35	40.35
2½ inches	57.45	42.35	up to 4 in.
2¾ to 3 inches	63.35	49.85	48.35
6 to 13 inches	54.85	37.35	....

Local jobbers are enjoying a good trade on Boiler Tubes, following the reduction in prices noted last week on 2¾ to 5 inch diameters. Present discounts are as follows:

	Steel.	Iron.	Seamless steel.
1 to 1½ inches	40	35	37½
1¾ to 2½ inches	50	32½	35
2¾ to 5 inches	60	45	45
6 inches and larger	50	32½	..

Sheets.—The Sheet business is picking up a little, though buyers are endeavoring to force mills to hand over to them the saving effected in labor at the conference with the Amalgamated Association in the middle of December. As the mills were previous to the readjustment of labor selling Sheets at considerably less than cost, no marked decline is considered possible with Sheet Bars at $24, base, Pittsburgh. Prices vary with the mill reporting, but in few cases do they fall much below the following: No. 10, 1.91½c. to 1.96½c.; No. 12, 1.96½c. to 2.01½c.; No. 14, 2.01½c. to 2.06½c.; No. 16, 2.11½c. to 2.16½c.; Nos. 18 and 20, 2.16½c. to 2.26½c.; Nos. 22 and 24, 2.26½c. to 2.36½c.; No. 26, 2.36¾c. to 2.41½c.; No. 27, 2.41½c. to 2.46½c.; No. 28, 2.46½c. to 2.51½c. Store business is only fairly active at the following prices: Nos. 8 and 10, 2.15c. to 2.20c.; No. 12, 2.20c. to 2.25c.; No. 14, 2.30c. to 2.35c.; No. 16, 2.40c. to 2.45c.; Nos. 18 and 20, 2.55c. to 2.60c.; Nos. 22 and 24, 2.65c. to 2.70c.; No. 26, 2.75c. to 2.80c.; No. 27, 2.85c. to 2.90c.; No. 28, 2.90c. to 3c. Galvanized Sheets are a little more active than last week on the basis of 80 to 80 and 2½ discount, Pittsburgh, plus full freight, for carload lots, and about 75 and 10 from mill in less than carload lots, with prices from store steady at 75 and 5 on ordinary lots to 75 and 7½ on large lots

Billets.—The market is quiet, with Open Hearth or Bessemer Forging or Rolling Billets quoted at $24 per gross ton, Chicago, in carload lots.

Merchant Pipe.—The leading producer of Pipe announces in Chicago a revision of prices. By comparing the discounts given below with those that have been maintained

all of last year it will be seen that two points better in discount are given on all sizes but ½ inch, which has been given the advantage of three points better discount. This makes the official prices as follows, in carload lots, Chicago:

	Steel Pipe.		Galv. Wrought Iron.	
	Black. Per cent.	Galv. Per cent.	Black. Per cent.	Galv. Per cent.
⅛ to ⅜ inch	68.35	58.35	65.35	55.35
½ inch	71.35	61.35	68.35	58.35
¾ to 6 inches	75.35	65.35	72.35	62.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ per cent. advance.

Cast Iron Pipe.—Business is looking up a little in this line in the way of increased orders and inquiries. Among orders taken by the leading producer are 1200 tons of 4's to 20's Water Pipe for the city of Los Angeles, Cal., and 900 tons 6 to 12 inch Water Pipe for Minneapolis; Portland, Ore., is in the market for 1800 tons and St. Paul for 800 tons, and it is expected that both these contracts will be closed before the middle of the month. The active spring buying, however, is not expected to show itself for a month or more to come, as the character of the soil and climate in the markets tributary to Chicago prevents Pipe laying as early as it can be done at most Eastern points. The McKenzie-Mann Syndicate, who are building the Canadian Northern Railway, are reported to be in the market for a large tonnage of Cast Iron Pipe and Culverts, though details are not yet obtainable. Official prices remain at $27.50 to $28 for 4-inch, and 50c. less for 6-inch Water Pipe and $1 per net ton higher for Gas Pipe. Concessions are made in instances where large tonnages are involved.

Rails and Track Supplies.—The most noteworthy transaction in the Rail industry for the week is a purchase of 40,000 tons of Standard Section Rails by the McKenzie-Mann Syndicate, who are building the Canadian Northern Railway. The Rails were placed with the Illinois Steel Company, for delivery at Port Arthur, at the head of Lake Superior, at just about $23 per ton, although the company selling decline to give any information or even to acknowledge that they took the order. As this is an export proposition, the members of the Rail Association are not bound to adhere to the domestic price of $28. The order was taken against competition on the part of European Rail producers and it is thought that an element in the low price quoted was the fact that the Steel company can utilize returning Ore boats for shipment of the tonnage at very low rates. Domestic roads have not yet begun buying in any quantity, though inquiries are coming in with renewed activity, particularly from electric roads. A noteworthy feature of the buying of these roads is that each year their specifications call for heavier Sections than the year before, many of them adopting the same weights as the steam roads. Standard Sections are still quoted at $28, and Light Sections at about $28 for 12-lb., $27 for 16-lb. and $26 to $25 for Heavier Sections. Light Rails are sold from stock at 1.60c. by the leading interest. We reduce our quotation of last week on Angle Bars 5c. per 100 lbs., naming a new price of 1.40c. to 1.50c.; Spikes, 1.80c. to 1.90c., base.; Track Bolts, 2.50 to 2.60c., base, with Square Nuts, and 10c. to 15c. advance for Hexagon Nuts.

Merchant Steel.—Holiday week was rather quiet in specifications, and orders on Merchant Steel, although the present week opens up with greater business. Prices remain unchanged, as follows: Open Hearth Spring Steel to the general trade, 2c. to 2.25c.; Smooth Finished Machinery Steel, 1.71½c. to 1.81½c.; Smooth Finished Tire, 1.66½c. to 1.76½c.; Sleigh Shoe, 1.51½c. to 1.61½c.; Cutter Shoe, 2.25c. to 2.35c.; Toe Calk Steel, 2.01½c. to 2.11½c.; Crucible Tool Steel, 6½c. to 8c.; Special Tool Steel, 12c. up; Shafting at 52 per cent. in car lots and 47 per cent. in less than car lots.

Old Material.—We reduce Old Steel Rails, short lengths, 50c. per gross ton, Railroad Malleable and Agricultural Malleable 50c. per net ton, and advance Relayers 50c.; Heavy Melting Steel Scrap, 50c.; No. 1 Railroad Wrought, 50c.; Heavy Cast Scrap and Stove Plate and Light Cast Scrap, 50c. What buying there has been done is mostly on the part of dealers, as Steel mills are conspicuous by their inactivity in the Scrap market. We quote as follows, per gross ton, Chicago:

Old Iron Rails	$13.00 to $14.00
Old Steel Rails, 4 feet and over	11.00 to 11.50
Old Steel Rails, less than 4 feet	9.00 to 9.50
Heavy Relaying Rails, subject to inspection	23.00 to 24.00
Heavy Relaying Rails, for side tracks	18.00 to 20.00
Old Car Wheels	13.00 to 13.50
Heavy Melting Steel Scrap	10.00 to 10.50
Mixed Steel	8.00 to 9.00
Mixed Country Steel	7.50 to 8.00

The following quotations are per net ton:

Iron Fish Plates	$12.00 to $12.50
Iron Car Axles	14.75 to 15.25
Steel Car Axles	12.50 to 13.00
No. 1 Railroad Wrought	10.50 to 11.00
No. 2 Railroad Wrought	9.00 to 9.50
Shafting	13.00 to 13.50
No. 1 Dealers' Forge	8.75 to 9.00
No. 1 Busheling and Wrought Pipe	8.00 to 8.50
Iron Axle Turnings	7.50 to 8.00
Soft Steel Axle Turnings	7.50 to 8.00
Machine Shop Turnings	7.00 to 7.25
Cast Borings	3.50 to 4.00
Mixed Borings, &c.	3.50 to 4.00
No. 1 Boilers, cut	8.50 to 9.00
Heavy Cast Scrap	10.50 to 11.50
Stove Plate and Light Cast Scrap	9.00 to 9.50
Railroad Malleable	8.00 to 8.50
Agricultural Malleable	7.50 to 8.00

Metals.—Pig Tin shows another advance and is now quoted at 30¼c. to 30½c., with more sales being made at the high than at the low prices. No other changes are noted on new materials in the balance of the list. We quote: Casting Copper is offered at 12⅞c. to 13¼c.; Lake, ¼c higher. Lead in 50-ton lots shows an advance of 15c., being now quoted at 4.20c.; car lots at 4.25c.; less than car lots at 4.40c. Spelter remains at 4¾c. in car lots and 5c. in less than car lots. Sheet Zinc is offered at 5.65c. per lb. in car lots of 600-lb. casks; less than car lots in 600-lb. casks, 5.85c., with the usual advances for smaller casks. Old Metals remain steady, with the exception of Lead, which is stronger and advanced 15c. per 100 lbs. Heavy Cut Copper sells at 10¾c., Copper Bottoms at 10c., Red Brass at 10c., Lead at 4c., and Zinc at 3.50c., spot.

Coke.—Connellsville and Rainey Cokes are sold at from $4.85 to $5.05 per ton in carload lots, Chicago, with West Virginia at $4.65 to $4.90. The market is a little more active than last week, with one interest reporting a decided improvement both in inquiry and sales.

Philadelphia.

PHILADELPHIA, PA., January 5, 1904.

The new year does not open very auspiciously, and it is doubtful if there will be any great activity in the immediate future. There is a considerable amount of inquiry for Pig Iron, but, apart from that interest, business is extremely dull. It is little too early, however, to size up the situation with much certainty, although there is not much probability of any important increase in the volume of business until toward spring. There are so many problems to be solved during the next few weeks that the majority will feel like sailing very close to the wind. The agreement to restrict the production of Pig Iron has worked very well, and it is believed that supply and demand are very evenly balanced, and with just a little more demand the market could easily assume a strong position. This is a matter, however, which will have to work itself out, and in any event it would be somewhat optimistic to expect prices to harden. In the more advanced products the market is distinctly dull. Prices of many articles by a standing agreement among manufacturers are unchanged, but there is hardly anything doing beyond the usual day to day demand. Bar Iron is weaker, however, and 1.35c., delivered, is an open price for good Iron, although some leading mills refuse to meet that figure; but the feeling in all departments is that business is under holiday conditions, and at the moment it is difficult to say how soon or how long it will be before normal conditions are resumed.

Pig Iron.—The situation is a little mixed. There is a great deal of inquiry, and in some respects it would appear that things are going to be better, but prices are certainly easier than they were before the holidays. It cannot be said that there is any weakness, but for some reason or other sellers of Pig Iron are not quoting as high figures as they were a week or two ago. No. 2 X Foundry, which was firm at $15 to $15.50, can now be had at $14.75 to $15, and on a first-class order it is not improbable that the inside figure could be shaded a trifle. Some may ask higher figures than we have named, but all the same, good Iron can be had at the low figures also. There is no special change in the general situation, and the motive for a reduction is not very clear. It may be that too much Iron is coming from the South, and to retain trade it is considered good policy to bring prices nearer together, but whatever the cause, the fact remains as stated. There is considerable doubt as to the tonnage that will be required during the next three or four months, and until that is settled it will be difficult to say much about prices. No advance is looked for under any circumstances, but the market is so well in hand that no decline is likely, beyond what will afford a reasonable margin to producers. If they follow on the same lines as during the past three months, prices will be regulated by the cost of production and not by the necessity for finding a market regardless of cost. After an unrestricted production and stocks have become unwieldy, it is impossible to maintain prices, but if stocks can be kept within reasonable limits, there need be no trouble about prices. Of course, it is hard to say what may happen before midsummer, but if the same unanimity is maintained among producers as during the past three months, the market will not be subject to violent fluctuations. To-day's prices for Philadelphia and nearby deliveries range about as follows:

No. 1 X Foundry	$15.50 to $16.00
No. 2 X Foundry	14.75 to 15.25
No. 2 Plain	14.00 to 14.50
Southern No. 2, rail shipment	13.75 to 14.00

Southern No. 2, on dock	13.00 to	13.50
Standard Gray Forge	13.50 to	14.00
Ordinary Gray Forge	12.75 to	13.25
Basic	.... to	14.00

Steel.—There is a great deal of inquiry, and prospects of considerable buying within the next week or ten days. Steel is wanted, and although no large orders may be taken, there is a fair chance that the mills will get quite a lot of work. Prices steady at $24.25 to $25, according to quantity, analysis, &c.

Finished Material.—There is no activity in any line at the moment, but it is expected that the accumulation of orders will enable the mills to make a fair output during the next few weeks. Bar Iron is weak and can be had at about 1.35c. and upward for strictly Refined Iron. Sheets are in demand and some very good orders have been entered, with others likely to be closed in the course of a few days. While the market for Finished Material may be called a waiting one, there is a somewhat hopeful feeling that business will be better in the near future.

Old Material.—The feeling is little stronger in Old Material, and it looks as though business was on the verge of improvement. Prices are low and buyers are beginning to nibble around, although at present bids are at extremely low figures. Bids and offers for deliveries in buyers' yards are about as follows:

Old Steel Rails	$11.50 to	$12.00
Heavy Steel Scrap	11.00 to	11.50
Low Phosphorus Scrap, nominal	16.00 to	18.00
Old Steel Axles	14.00 to	15.00
Old Iron Rails	16.00 to	16.50
Old Iron Axles	15.50 to	16.00
Old Car Wheels	12.75 to	13.50
Choice Scrap, R. R. No. 1 Wrought	14.50 to	15.50
Country Scrap	12.00 to	13.00
Machinery Scrap	12.50 to	13.00
No. 2 Light Scrap	11.00 to	11.50
No. 2 Light (Ordinary)	9.00 to	9.50
Wrought Turnings	9.25 to	9.75
Wrought Turnings, Choice Heavy	10.00 to	10.50
Cast Borings	6.25 to	6.75
Stove Plate	9.50 to	10.00
Wrought Iron Pipe	10.00 to	10.50

The copartnership heretofore existing under the firm name of Morris, Wheeler & Co., having been terminated by the death of Andrew Wheeler, Sr., Andrew Wheeler, Jr., succeeds to the interest held in the firm of Morris, Wheeler & Co. of Philadelphia, by his father, Andrew Wheeler, Sr. Frederick W. Morris, Jr., and George L. Morris are admitted as new partners.

Mason G. Worth & Co. announce the removal of their offices from the Witherspoon Building to 1209 and 1210 Real Estate Trust Building, Philadelphia.

Pittsburgh.

PARK BUILDING, January 6, 1904.—(*By Telegraph.*)

Pig Iron.—While the Pig Iron market is quiet, we may note that Southern furnaces are very firm in their ideas as to prices, and are holding No. 2 Foundry firm at $10, Birmingham, equal to $14.35, Pittsburgh. This price is prohibitory in this market, as Northern No. 2 Iron can be bought at $13, Valley, or $13.85, Pittsburgh. It is said that considerable tonnage of Northern No. 2 Foundry Iron has been sold short and this has disturbed the local foundry market to some extent. It is claimed that Southern furnaces have sold in the past month or six weeks upward of 500,000 tons of Foundry Iron at prices ranging from $9 and upward, at furnace, and with this tonnage on their books they are in an independent position and are now disposed to hold their Iron for higher prices. The Bessemer Iron market is rather quiet and we note a sale of 1000 tons at $13.25, Valley, or $14.10, Pittsburgh, and another sale of 1500 tons at $13.20, Valley, or $14.05, Pittsburgh. So many mills are closed that there is very little doing in Forge Iron, and it is held at $13, Pittsburgh.

Steel.—The Steel market is quiet and very little tonnage is changing hands. While it is claimed that pool prices are in the main being held, it is also stated that concessions are being made in some cases to the extent of about $1 a ton. The appointment of receivers for the Clairton Steel Company is not expected to affect adversely the Billet agreement. We quote Bessemer and Open Hearth Billets at $23, with $1 a ton advance for Long Sheet Bars and $1.50 a ton advance for Cut Bars, Pittsburgh delivery.

Cincinnati.

FIFTH AND MAIN STS., January 6, 1904.—(*By Telegraph.*)

There is consensus of opinion among dealers that this is, as usual, the dullest season for the trade. Very little is doing in any department. The only excitement during the week was over a Malleable inquiry for 1000 tons for January and February shipment for a Southern Ohio concern. There was spirited bidding on the part of several of the furnaces, and the order finally went for a price below $13, f.o.b. Ironton, Ohio. This is the low water mark for Iron of this kind. In Southern Iron the largest Southern producers are all holding No. 2 Foundry at $10, f.o.b. Birmingham, but some scattering sales have been made at $9.50 and $9.75. It is hard to say what is the exact situation as regards Southern Iron, as for a week or two inquiry has been so small that there have not been transactions enough to really make a market. The Cincinnati Water Works are about to let a contract for 4000 tons of weights to be used in steadying a heavy caisson. The Iron to be used in these castings can be any low grade or inferior stuff. This Iron will be bought as soon as the contract is let, and there have been from many prospective bidders inquiries for Iron for this contract. These inquiries have been so numerous that it might seem as if about 50,000 tons of Iron were needed, but this is, of course, not the case. Indications seem to justify the prediction that before many days a firmer tone will prevail. Freight rates from Hanging Rock district to Cincinnati, $1.15, and from Birmingham, $2.75. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1	$12.50 to	$13.25
Southern Coke, No. 2	12.00 to	12.75
Southern Coke, No. 3	11.50 to	12.25
Southern Coke, No. 4	11.00 to	11.75
Southern Coke, No. 1 Soft	12.50 to	13.25
Southern Coke, No. 2 Soft	12.00 to	12.75
Southern Coke, Gray Forge	10.75 to	11.25
Southern Coke, Mottled	10.75 to	11.25
Ohio Silvery, No. 1	17.65 to	18.15
Lake Superior Coke, No. 1	14.65 to	15.65
Lake Superior Coke, No. 2	14.15 to	15.15
Lake Superior Coke, No. 3	13.90 to	14.90

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	$20.00 to	$21.00
Lake Superior Car Wheel and Malleable	19.00 to	20.00

Plates and Bars.—Continued improvement is noted among dealers, with more demand than for some weeks previous. The situation is undoubtedly growing better, and contracts are being made showing quite an increase over the previous month. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.35c., with half extras; the same in smaller lots, 1.90c., with full extras; Steel Bars, carload lots, 1.43c., with half extras; the same in smaller lots, 1.80c., with full extras; Base Angles, 1.73c., in carload lots; Beams and Channels, in carload lots, 1.73c.; Plates, ¼-inch and heavier, 1.70c., in carload lots; in smaller lots, 2c.; Sheets, 16 gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; 14-gauge, in carload lots, 1.95c.; in small lots, 2.50c.; Steel Tire, ¾ x 3-16 and heavier, 1.63c., in carload lots.

Old Material.—There is a little more activity noted in this class, with prices practically unchanged. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, $10 per net ton; No. 1 Cast Scrap, $10 per net ton; Iron Rails, $13 to $14 per gross ton; Steel Rails, rolling mill lengths, $10 per gross ton; Iron Axles, $15 per gross ton; Car Wheels, $11 per gross ton; Heavy Melting Scrap, $9.75 to $10 per gross ton; Low Phosphorus Scrap, $11.50 to $12 per gross ton.

St. Louis.

CHEMICAL BUILDING, January 6, 1904.—(*By Telegraph.*)

Pig Iron.—As was to be expected, the market for Pig Iron is within the most narrow limits, and trades the past week have been in small lots. It is said on good authority that the local trade, as well as that tributary to this market, is very generally covered for first quarter, and until the disposition is shown to anticipate for second quarter's delivery, a very dull period will prevail. The largest Southern producers are offering in this market for the first quarter delivery, No. 2 Foundry Grade at $10, Birmingham, while some other sources are said to be quoting $9.75 for same delivery. But an occasional inquiry for supplies beyond April 1 comes to hand. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry	$13.50 to	$13.75
Southern, No. 2 Foundry	13.00 to	13.25
Southern, No. 3 Foundry	12.50 to	12.75
Southern, No. 4 Foundry	12.00 to	12.25
No. 1 Soft	13.50 to	13.75
No. 2 Soft	13.00 to	13.25
Gray Forge	11.25 to	11.75
Southern Car Wheel	21.00 to	21.25

Bars.—The demand is reported to be light, a condition not surprising at this, the annual inventory. Jobbers are now quoting in lots from store: Iron Bars at 1.65c. and Steel Bars at 1.75c. for general trade, with some concessions to larger city business.

Angles and Channels.—Jobbers are selling Small Angles and Channels in lots from store at 2c., base. Trade is very quiet in these lines.

Pig Lead—Has not shown any great amount of activity the past week, but prices have held very steady, with a tendency to harden. Nominally, 4.17½c. for Missouri brands with slightly higher quotations for some special grades.

Spelter.—The market has inclined to strength, although not dominated by any unusual activity. Nominally, 4.75c.

New York.

NEW YORK, January 6, 1904.

Pig Iron.—Apparently the sellers of Northern Pig Iron are inclined to give to their customers the benefit of what reductions in cost they have been able to effect, now that new contracts for material and lower wages have been secured. The principal lowering has been in Coke and in Cinder, there having been no recent reduction in Anthracite Coal. The result is that prices for Northern Iron are easier, while, on the other hand, Southern Iron has stiffened. The volume of business has been fair, for prompt delivery and for the first quarter. One fact which tells in favor of the Northern furnaces is the irregularity of and the delays in the deliveries of Southern Irons. Some sales of Basic have been made in New England, the tonnage aggregating about 4500 tons. We quote: Northern No. 1 Foundry, $15 to $16; No. 2 Foundry $14.50 to $14.75; No. 2 Plain, $13.75 to $14.25, and Gray Forge, $13.25 to $13.50, tidewater. Tennessee and Alabama brands are quoted nominally $14.25 to $14.50 for No. 1, $13.75 to $14 for No. 2, and $13 to $13.25 for No. 3 Foundry.

Steel Rails.—So far as Standard Sections are concerned, the market is very dull. In Light Sections the market is a shade firmer, owing to the shutting down of one of the leading mills. We quote $28 for Standard Sections and $23 to $27 for Light Sections, at mill.

Cast Iron Pipe.—While actual business now being placed is limited to small quantities, manufacturers report a constant stream of inquiries, with every indication pointing to heavy contracting for the spring months. They are generally of the opinion that this year may be found better than last year in the quantity of business handled. Carload lots are quoted at $28 per gross ton for 6 to 10 inch, and $27 for 12-inch upward, at tidewater, with concessions on large quantities.

Finished Iron and Steel.—The American Bridge Company report that the year just closed compares quite favorably with 1902 in tonnage delivered. The falling off was less than 12,000 tons, or under 1000 tons a month. Some good contracts are now in sight, and it is expected that part of this business, at least, will be placed during the coming week. The situation in the local building trade has completely cleared so far as labor is concerned, and all interests connected with the trade are looking forward to a very much better year than 1903. Bar Iron manufacturers report more business booked the past week than during the entire previous six weeks. Contracts are coming out freely for delivery over the next 60 days. Manufacturers are now becoming a little more confident of being able to secure better figures and some are disposed to let considerable business pass, expecting to get more profitable prices later. Plate inquiries have not recently developed much business, the tonnage referred to last week not yet having been placed. We quote, at tidewater, as follows: Beams, Channels, Angles and Zees, 1.74½c. to 2c.; Tees, 1.79½c. to 2c.; Bulb Angles and Deck Beams, 1.84½c. to 2.05c. Sheared Plates in carload lots are 1.74½c. to 1.85c. for Tank, 1.84½c. to 2c. for Flange, 1.94½c. to 2.10c. for Marine, and 1.94½c. to 2.50c. for Fire Box, according to specification. Common Bar Iron, 1.30c. to 1.40c.; Refined Bars, 1.45c. to 1.60c., according to quality; Soft Steel Bars, 1.44½c. to 1.50c.

Old Material.—A little better demand for Steel Scrap is noted, but buyers want lowest prices. Old Iron Rails are also being inquired for, and Wrought Scrap can be moved somewhat better. A sale of 1500 tons of Old Steel Rails for rerolling has been made at $12, delivered, on the line of the road. Cast Scrap is in moderate demand. The market for Scrap generally must now be found in the immediate locality in which it originates. Every consuming center appears to have a sufficient local supply. Quotations per gross ton, New York or vicinity, are as follows:

Old Iron Rails	$15.50 to $16.00
Old Steel Rails, long lengths	12.00 to 13.00
Old Steel Rails, short pieces	11.00 to 11.50
Relaying Rails, heavy sections	18.00 to 19.00
Old Car Wheels	12.50 to 13.00
Old Iron Car Axles	16.00 to 17.00
Old Steel Car Axles	14.00 to 15.00
Heavy Melting Steel Scrap	11.00 to 11.50
No. 1 Railroad Wrought Iron	12.50 to 13.50
Iron Track Scrap	11.50 to 12.50
Wrought Pipe	9.00 to 10.00
Ordinary Light Iron	7.00 to 7.50
Cast Borings	5.00 to 5.50
Wrought Turnings	8.00 to 8.50
No. 1 Machinery Cast	12.00 to 12.50
Stove Plate	9.50 to 10.50

Among the saddest of the fatalities in the burning of the Iroquois Theater, Chicago, on December 30, were the deaths of William T. Palmer, his wife and their two sons, comprising the whole family. Mr. Palmer was for eight years a traveling salesman of the American Tube Works of Boston. Later he became resident sales agent of the S. F. Bowser Mfg. Company, at Fort Wayne, Ind. In May, 1891, he associated himself with the Benedict & Burnham Brass & Copper Company of Chicago, traveling in territory west of the Alleghenies. John Dryden of the order department of Hibbard, Spencer, Bartlett & Co. lost his wife and son. Edward Payson, president of the Payson Mfg. Company, lost a daughter. George Cook of Bullard & Gormley Company lost a sister-in-law. Ludwig Wolff, president of the L. Wolff Mfg. Company, lost two daughters and two grandsons. One daughter was the wife of F. W. Garn, president of the Eclipse Pulley Covering Company. R. T. Crane, president of the Crane Company, lost two granddaughters, the children of A. F. Gartz, treasurer of the same company. A sister of Mr. Gartz was also seriously burned. Charles C. Knoll, superintendent of the Chicago Stove Works, lost his wife and a niece. Fred. Pond, for many years cashier of the Deering Harvester Company, lost his wife and two children. A son of Hermon B. Butler, vice-president of Joseph T. Ryerson & Son, had a narrow escape.

Iron and Industrial Stocks.

Prices of industrial stocks suffered on Saturday in the general slump which took place on the report that Russia and Japan were on the point of beginning hostilities. The market recovered to some extent on Monday, but was again affected adversely on Wednesday by the passage of the dividend on the common stock of the United States Steel Corporation and the statement issued showing greatly reduced earnings for the past quarter. Last prices on active stocks up to 1.30 on Wednesday were as follows: Car and Foundry common 17¾, preferred 67½; Locomotive common 16¾, preferred 75½; Colorado Fuel 29; Pressed Steel common 27½, preferred 69; Railway Spring common 22⅞, preferred 76; Republic common 7¼, preferred 42; Sloss-Sheffield common 31¾, preferred 77½; Tennessee Coal & Iron 35¾; United States Steel common 10⅛, preferred 55⅛; new 5's 69¼.

Dividends.—United States Steel Corporation have declared the regular quarterly dividend of 1¾ per cent. on the preferred stock, payable February 15. Books close January 19, and reopen February 16. The dividend on the common stock has been passed.

Chicago Pneumatic Tool Company have declared a quarterly dividend of ¾ per cent.

Stockholders of the United States Steel Company of Everett, Mass., have brought bills in equity in the Massachusetts courts asking that a receiver be appointed for the benefit of the stockholders. The officers of the company are also named in the bills of complaint. Mismanagement is alleged. Injunctions are asked for, restraining the officers of the company from disposing of any stock or bonds in the name of the company, or of any of the company's property. The legal action grew out of a recent meeting of the stockholders, when it was proposed to dispose of certain property of the company to provide additional funds for the conduct of the business.

J. J. McCabe, 14 Dey street, New York, has taken the Eastern agency for the line of punching and shearing machinery built by the George B. Sennett Company, Youngstown, Ohio, while the Fairbanks Company, Montreal and Toronto, have the agency for the Dominion of Canada.

The recently organized Eclipse Rolling Mill & Mfg. Company, Birmingham, Ala., have let the contract for the erection of their plant and expect to have it in operation about March 1. They will manufacture bar iron, small rails, channels, angles, Z bars and hexagonal shapes, and will make a specialty of spikes, rivets and wrought iron washers.

Notice has been posted at the Elwood, Ind., factory of the American Tin Plate Company of a reduction of 10 per cent. in wages of the common laborers there, beginning Jan. 1.

The unskilled laborers in the employ of the Republic Iron & Steel Company, at East St. Louis, Ill., have been notified of a 10 per cent. reduction in wages.

Cleveland.

CLEVELAND, OHIO, January 5, 1904.

Iron Ore.—The shipment of Ore from the lake docks to the furnaces has started with some speed.

Pig Iron.—This week has seen but comparatively little business. It is evident that inventory time is not altogether past and the trade is hesitating. The inquiries which have come in have, however, become a little stronger than they were a few weeks ago. In the main the Valley furnaces are trying to hold for about $13.50 for No. 2, but they have slipped below that price to some extent when a choice order appeared. The Coke situation as to supply is all that could have been desired. The prices cover a wide range, according to the source of supply. The best 72-hour Coke is selling at $2.25 to $2.65 at the oven, while high sulphur Cokes range between $2 and $2.15. We quote, f.o.b. cars, Cleveland:

Northern Coke, No. 1 Foundry	$14.50 to $15.00
Northern Coke, No. 2 Foundry	14.00 to 14.50
Northern Coke, No. 3 Foundry	13.50 to 14.00
Southern Coke, No. 1 Foundry	14.25 to 14.50
Southern Coke, No. 2 Foundry	13.75 to 14.00
Southern Coke, No. 1 Soft	14.25 to 14.50
Southern Coke, No. 2 Soft	13.75 to 14.00
Jackson County, 8 per cent. Silicon	.... to 17.45
Hanging Rock Charcoal, No. 1	.... to 23.45
Southern Charcoal, No. 1	20.00 to 20.50
Lake Superior Charcoal	18.00 to 18.50

Finished Iron and Steel.—A better buying movement has made itself manifest all through the Iron and Steel trade for the past week. The check to the market up to this time seems to have been in the lack of activity in Structural Steel and Plates. The situation has taken a brace in that direction and some contracts for Structural have been placed. In the main they have been small, but satisfactory notwithstanding. In Plates the buying has been a little more modest, but the market has been strong nevertheless, with inquiries good and specification against former contracts improved. The buying of Rails has also shown a better tone. There are inquiries in now for 10,000 tons, to be delivered by the opening of spring, if possible. Some delayed electric line projects are beginning to spring into life. There has been a better demand for Iron Bars. The feeling now is that prices have reached absolutely the bottom while the price of Scrap remains as it is. Several good orders have been placed on the basis of 1.30c., Youngstown. The tone of the Steel Bar trade has also improved. The indications, as seen in the inquiries, are for a good buying movement within a short time. The buying of Sheets has been better than it was a short time ago.

Old Material.—The market has been a little steadier and the demand seems to have increased slightly. The prices in many respects are purely nominal; but, approximately, the following quotations are justified, all gross tons: Old Steel Rails, $14 to $15; Old Iron Rails, $16; Old Car Wheels, $13.50 to $14; Railroad Malleable, $12 to $12.50; Cast Borings, $4 to $5. All net tons: No. 1 Railroad Wrought, $11.50 to $12.50; No. 1 Busheling, $9.50 to $10.50; Wrought Turnings, $6; Iron Car Axles, $17 to $18; No. 1 Cast, $10.50 to $11.50; Stove Plate, $9 to $10.

Metal Market.

NEW YORK, January 6, 1904.

Pig Tin.—Further advances in prices testify to the continuance of the operations of the European and Chinese manipulators. They are playing up the market very strenuously with a view of making the American consumers eventually pay the piper. The latter do not feel disposed to do so just yet and they are holding out of the market completely. Business here during the last week was at the lowest ebb. The market is nominally 29c. for spot and January. London quotes £131 2s. 6d. for both spot and futures.

Copper.—In sympathy with higher London quotations this market advanced a shade. Business for home consumption was very light. Lake is quoted 12⅝c. to 12¾c.; Electrolytic is 12⅝c. to 12⅝c., and Casting, 12⅛c. to 12⅜c. The London cables announce £57 15s. for spot, £57 2s. 6d. futures, and £61 10s. for Best Selected.

Pig Lead.—The market is firm and practically without change. Strict spot is quoted 4.35c. here. The figures recently established by the American Smelting & Refining Company are unchanged at 4.25c. for Desilverized, based on 30 days' shipment in 50-ton lots. St. Louis is quoted 4.20c. to 4.25c, and London has advanced to £11 7s. 6d.

Spelter—Is a shade firmer. Spot is quoted 5c. to 5.20c. St. Louis telegraphs 4.75c. to 4.85c. The London market advanced to £21 15s.

Antimony.—While quotations are unchanged here, the London market is weaker and lower. The market is easy at 7c. for Cookson's, 6.25c. for Hallett's, and 5.62½c. for other brands.

Nickel.—No change is noted in this market, 40c. to 45c. being quoted for large lots, and 50c. to 60c. for smaller quantities.

Quicksilver.—The market is quiet, but steady. Flasks of 76½ lbs. are quoted at $47.50. London is quoted at £8 5s.

Tin Plates.—The market is quiet, with a fair amount of business in a small way. Large consumers are said to be holding out of the market. Quotations are made on the basis of $3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to $3.79, New York. The Swansea market advanced 3 pence to 11 shillings 4½ pence.

Birmingham.

BIRMINGHAM, ALA., January 4, 1904.

There has been an inclination on the part of a respectable contingent among the buyers to take on some Iron for delivery the second quarter. But none of them could find a seller who would price for that delivery on the basis of current values. Some sellers decline outright to name a price for delivery beyond March, while some name $11 and $11.50, basis of No. 2 Foundry, which they know is prohibitory to new business. As far as can be learned, there is but little Iron for that delivery on the order book. There is an unmistakable disposition on the part of sellers to keep "close to shore" on the delivery question and to avoid as far as possible any entangling alliances in that respect. There are some who will not make any price for more than 30 days ahead, while some will sell as far ahead as the last of March. The bulk of the sales have been for nearby delivery, and the furnaces are making them as near current date as they can dictate. During the week there were sales of No. 2 Foundry at $10 and other grades in proportion. One interest reports sales of 2500 tons during the week, another sales of 2000 tons, and a third sales of over 6000 tons on that basis, the orders being received by mail from regular customers. There was some talk about a sale to a Western buyer on the basis of $9.25 here for No. 2 Foundry, but the Iron was not full grade and would not bring full grade price. As it was sold Birmingham basis, this point gets the credit for the sale when, in reality, it went from another district. The report of the sale had no appreciable effect upon the market. There were some sales early in the week at basis of $9.75 for No. 2 Foundry, but if there were any at lower values the sellers will not acknowledge them. On the last day of the old year a leading interest wired all their agents to take no orders below $10 for No. 2 Foundry, and to give no time options for acceptance, and to keep prepared for a withdrawal of that quotation at any time. Another very large interest did practically the same thing. At this writing, $10 for No. 2 Foundry is the prevailing asking price. A large majority of the furnaces will be put to it to make their deliveries in the next two months. One very large and leading interest confesses to having over 100,000 tons to ship and deliver during this and the following month. This condition only represents to a greater or less degree the condition of all. As to the furnaces now out of blast, they number 16 in this State and the number will probably be increased to 18. There is very little probability of the current output being materially increased in the near future.

At the Steel mill, at Ensley, they are still preparing for resumption of business. The mixer which they have been installing is practically completed. The converter is now being installed, and that is now only a question of hours.

J. R. McWane, the head of the casting plant to be erected here, has arrived and taken charge of its destinies, and as soon as preliminary arrangements can be made, operations on the buildings will commence. It is expected that at a very early date operations on the new boiler plant will commence. When completed, it will be the largest plant of the kind in the district.

The Pipe works duplicate their previous report of business and say that, if anything, it has grown brighter and better since last quoted, and they have revised quotations that average an advance of about $1 all around. Prices are now for 4-inch Pipe, $24.50; for 6-inch, $24; for 8 to 16 inch, $23, and for Heavy Pipe, $22. There is a fine inquiry for the output and there is a good deal of dickering going on for good lots for export, as well as considerable negotiations for domestic trade. The United States Pipe Company are credited with being at work now on a large export order. All the companies have been good buyers of Iron in the recent past.

The furnace interests of the productive centers in the South, at the meetings held the past week, arrived at no definite conclusions, and formulated no definite plan of action. The situation was informally and fully discussed, but just how they were to get together was the question they failed to solve. The meeting, before adjourning, appointed a committee to consider the situation and to evolve a plan that would be acceptable to all the interests.

The United States Steel Corporation's Showing for 1903

The statement of the United States Steel Corporation and the subsidiary companies for the year 1903, compared with 1902, as given out after the meeting of the Board of Directors on January 5, is as follows:

Net Earnings.

	1903.	1902.
January	$7,425,775	$8,901,016
February	7,730,361	7,678,583
March	9,912,571	10,135,858
April	10,905,204	12,320,766
May	12,744,324	13,120,930
June	12,992,780	12,220,361
July	12,384,647	12,041,914
August	10,918,174	12,972,729
September	9,120,134	11,930,846
October	7,675,141	12,652,707
November	4,069,901	10,686,906
December (estimated)	3,100,000	8,646,147
Total net earnings after deducting, each month, the expenditures for ordinary repairs, renewals and maintenance of plants, also interest on bonds and fixed charges of the subsidiary companies	$108,979,012	$133,308,763
Less, appropriated for the following purposes—viz.:		
Sinking funds on bonds of subsidiary companies	$1,590,352	$624,064
Depreciation and extinguishment funds (regular provisions for the year)	4,485,120	4,834,710
Extraordinary replacement funds (regular provisions for the year)	9,194,715	9,315,615
Special fund for depreciation, improvements and construction	10,000,000	10,000,000
	$25,270,187	$24,774,389
Balance of net earnings for the year	$83,708,825	$108,534,374
Deduct:		
Interest on U. S. Steel Corporation bonds for year	$19,086,945	$15,187,850
Sinking funds on U. S. Steel Corporation bands for year	3,797,500	3,040,000
	$22,884,445	$18,227,850
Balance	$60,824,380	$90,306,524
Less: Charged off for depreciation in inventory valuations and for adjustments of sundry accounts (estimated)	5,750,000	.....
Balance, available for dividends	$55,074,380	$90,306,524
Dividends for year on stocks of U. S. Steel Corporation—viz.:		
Preferred, 7 per cent	$30,404,173	$35,720,177
Common, 2½ per cent	12,707,562	20,332,690
	$43,111,735	$56,052,867
Undivided profits or surplus for the year	$11,962,645	$34,253,657

Unfilled Orders on Hand.

	Tons.
December 31, 1903	3,215,123
December 31, 1902	5,347,253

NOTE.—The Corporation's fiscal year corresponds with the calendar year, and complete annual report, comprising general balance sheet, financial statements, statistics, &c., will be submitted at the annual meeting in April, 1904, or earlier.

The last quarter of last year was the poorest from the standpoint of earnings in the history of the corporation. The figures show that earnings have been on the decline since June of last year. They have been going down gradually, the December statement showing estimated earnings of not much over $3,000,000. This gradual decrease is the most unfavorable feature of the report. In December earnings were almost two-thirds less than in the corresponding month of 1902. Preparations are being made to meet this unfavorable development in business by reductions in wages and the institution of important economies.

The amount set aside for depreciation, sinking funds, &c., was practically the same as in the preceding year. Contrary to expectations, a special fund of $10,000,000 was set aside for depreciation, improvements and construction. A similar amount was set aside in 1902. A new item that appears in the statement, and which has been looked for with great interest, is the charging off for depreciation in inventory valuations, and for the adjustment of sundry accounts, which amounts to $5,750,000.

The statement reports the tonnage of unfilled business on December 31 last as 3,215,000, compared with 5,347,253 on the corresponding date of the preceding year. Interest payments show an increase and dividend payments a decrease, a natural result of the operation involving the conversion of preferred stock into 5 per cent. bonds. The statement was made Tuesday that the Steel Corporation was determined to accumulate a surplus of $250,000,000, and not until this has been accomplished would dividends be resumed on the common stock. The dividend was passed on the common, but the regular dividend was declared on the preferred.

The Fort Wayne Iron and Steel Company.—On December 18 the muck mill of the Fort Wayne Iron & Steel Company, Fort Wayne, Ind., was started up and the entire plant is now in operation. Early last spring the Fort Wayne Company were organized and took over the Muskegon, Mich., plant of the American Rolling Mill Corporation. They immediately moved the plant and erected it at Fort Wayne. The main building is an L shaped structure, 300 x 308 feet, and is equipped with machinery with a capacity of 150 tons of bar iron per day. Just south of this building is the blacksmith and machine shop, 40 x 52 feet, and 10 feet distant is the power house, containing two Heine boilers with a capacity of 450 horse-power. East of the plant are six gas producers. The only parts of the works not operated by gas are those of the muck mill furnaces, which use coal. The officers are E. F. Yarnelle, president; Walter I. Moody, vice-president; H. C. Rockhill, secretary; John W. Sale, treasurer; C. H. Rawlins, general manager, and George H. Lowe, superintendent.

The merging of the American Tin Plate Company and the American Sheet Steel Company into the new corporation, the American Sheet & Tin Plate Company, was accompanied in Chicago by the removal of the offices of the Tin Plate Company to the old quarters of the Sheet Steel Company in the Marquette Building. W. H. Eaton, formerly district sales agent for the Sheet Steel Company, has been put in charge of the consolidated offices. C. M. Stuart, formerly in charge of the Tin Plate Company's office, has resigned. W. V. D. Wright, formerly associated with him, has engaged in the metal brokerage business in Chicago on his own account. With these exceptions most of the old employees of both companies will be retained.

The Republic Iron & Steel Company, during 1903, installed at their Brown-Bonnell works, Youngstown, Ohio, 7, 8, and 10 inch Morgan continuous mills; increased the capacity of their Bessemer steel plant at the same place from 1000 to 1500 tons of steel billets per day; installed at their Sylvan works, Moline, Ill., an 8-inch Morgan continuous mill, and increased the capacity of their Nos. 1 and 2 blast furnaces at Thomas, Ala., from 150 to 225 tons per day.

At Birmingham, Ala., Judge Jones has rendered a decision declaring the Jenifer Iron Company insolvent. Receiver McQueen has been authorized to borrow $10,000. He has recommended that the furnace be not sold for cash, as better terms could be obtained if it is sold on time. The company have a blast furnace and ore properties near Anniston, Ala.

The Insurance Engineering Experiment Station of Boston, of which Edward Atkinson is direcetor, has issued a report on Bog Fuel, the black mud of fresh water meadows, not customarily called peat bogs.

The Billings & Spencer Company of Hartford, Conn., are remodeling their furnaces with the purpose of substituting fuel oil for coal.

The New York Machinery Market.

NEW YORK, January 6, 1904.

Scarcely enough time has elapsed since the first of the new year to furnish any indications as to the disposition of prospective purchasers to throw off the hesitancy which has characterized their attitude toward the market of late. It was not expected that they would rush into the market immediately after changing calendars, and hence the trade does not attach especial significance to the quiet conditions which existed throughout the week under review. Even though the greatly anticipated appropriations were made at the annual meetings, some time will be required before any appreciable effect can be felt in the trade. There are no changes to be noted in prices.

It is very natural that there should be an absence of new projects at this time of the year. There are rumors abroad to the effect that there is a movement under way looking toward a merging of some sort of the interest of the Crane Company of Chicago and the Eaton, Cole & Burnham Company of New York and Bridgeport, Conn.

It is said in the trade that within the next few months the Massena Machine Company, Massena, N. Y., will be in the market for a quantity of mechanical equipment. The company were recently incorporated with a capital stock of $25,000, and have secured a site on the Massena Terminal Railroad, where they will erect a plant to consist of three brick, steel and concrete buildings, each 50 x 100 feet. It is expected that the buildings will be completed in the spring, at which time, they inform us, they will be in the market for the machinery. Electric power will be used.

William T. Cubby & Co., 81 Fulton street, New York, architects, yesterday opened bids for the power equipment for the new building to be erected on Thirty-eighth street, between Eighth and Ninth avenues, by the Publishers' & Printers Realty Company, of which Col. W. D. Mann is president. The equipment to be installed will be of 2000 horse-power capacity, which will later be increased to 2500 horse-power, and which will be divided into four units. There will be four 450-kw. generators, four 500 horse-power boilers and engines. It will be some days before the awards are made. The Mannados Engineering Company, Townsend Building, 125 Broadway, New York, are the engineers.

The Lukens Iron & Steel Company of Coatesville, Pa., desire to receive the latest catalogues and price-lists on articles used in general rolling mill and open hearth furnace practice.

Kaltenbach & Griess, Cleveland, Ohio, have been awarded the contract for cranes for the Puget Sound Navy Yard, at their bid of $39,789.

The American Hoist & Derrick Company, St. Paul, Minn., have been awarded the contract for the cranes for the Boston Navy Yard, at their bid of $75,950.

The contract for the cranes for the Portsmouth Navy Yard has been awarded to the Browning Engineering Company, Cleveland, Ohio, at $44,500.

The Clairton Steel Company Receivership.—It is the conservative opinion at Pittsburgh that the appointment of receivers for the Clairton Steel Company, while regretted, was the best thing that could be done in order that the interests of all the creditors should be protected alike. We may state that the negotiations for the sale of the blast furnaces and open hearth steel plant of the Clairton Steel Company to the United States Steel Corporation have never been finally dropped, and in view of the appointment of receivers, it is practically certain that the Clairton plant will be sold to the Steel Corporation, and probably within a very short time.

Resumption at Chicago.—CHICAGO, ILL., January 6, 1904.—The Illinois Steel Company will resume work in their Joliet plant in all departments next Monday morning. The plant has been closed down for about a month. The Bay View works are now working in most of the departments. The South Chicago works, which are closed down in all finishing departments, will be put in operation later in the month. Some of their stacks are in operation at the present time.

The Copper Manual.—The third volume of the Copper Manual, in very handsome form, by D. Houston & Co., Metal brokers, of 22 Platt street, New York, has just been issued. It contains a description, in very many cases fully illustrated, of every important Copper mine in the United States, with full financial and trade information. It is more complete and comprehensive even than the volumes which preceded it, and is worthy of the close study of any one interested in the red metal. The price is $3 per volume.

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HARDWARE.

THE business depression which has prevailed for the past few months has been remarkable for many interesting and conflicting phases, some of which may well claim consideration. Foremost among them is

THE EFFECT OF SENTIMENT UPON BUSINESS.—While there has been no disturbance in the commercial world at all commensurate with that in the financial world, there is no doubt that the declines in Wall Street spread a gloom over the business community such as has not been known for years, and from the shadows of which we are only now emerging. Arguments as to the inherent soundness of the country at large were of little avail in relieving the general depression or in mitigating the apprehension that financial trouble, or, at best, a more or less complete interruption of prosperous conditions, was impending. The revulsion from the high hopes and sustained realizations of the past five years, while natural and logical enough, was of an acuteness not often experienced. It did not help matters that the condition had been foreseen and prophesied, but the date of its coming was always set for some indefinite future time. The causes of declines in stocks are too well known to need recapitulation, but the ultimate effect of these declines upon business was most serious and far reaching. Money became scarce and high, and new enterprises received a sudden and severe check. This brings us to the consideration of

THE EFFECT OF NEW ENTERPRISES UPON GENERAL BUSINESS.—It is not always realized that in the iron and steel trade one important difference between boom times and ordinary or even hard times is the promotion or the holding in abeyance of new enterprises. The natural consumption and repair of the country does not normally take up its productive capacity, as the increase in the latter is always in excess of the natural growth in consumption. There must be some abnormal demand to produce scarcity, and consequently high prices with accompanying prosperity. The cutting down of production by shutting down mills and furnaces, even if a matter of necessity, is merely an expediency for the interests immediately concerned, and does not remedy matters in the country at large, and adding to the number of idle men is indeed an offset to the advantages gained by any one interest by the temporary maintenance of prices in a given line. We cannot hope for the return of the flush times of the past five years until new enterprises are again promoted, and they, in turn, wait upon favorable financial conditions and the restoration of public confidence.

THE PREDOMINATING INFLUENCE OF AGRICULTURE.—Few things have been more clearly demonstrated within the past six months than that agriculture is still the chief dependence of the country. The anxiety of the summer months when the outcome of the crops was still in doubt testified to the universal feeling that most of all in a crucial time did the weal or woe of the country hinge upon the success or failure of the products of the soil.

THE PROBLEM OF LABOR.—The most disquieting feature of the present situation is the unrest of labor. It seems to be a state of dissatisfaction and discontent with its lot and place in the industrial and commercial sphere. It is not a question of wrongs to be remedied, but of a blind and somewhat inarticulate desire to have a larger share of this world's goods. Beneath it all lies the spreading principle of democracy that is leavening the whole mass. For instance, there is a deep rooted belief, and one that is not confined to the workingman only, that the laborer is not only worthy of his hire, but of some share in that wealth which he helps to produce. So far, however, the effort to solve this problem has met with but little success. Remedies applied indiscriminately have nearly always failed completely, and it is only where difference has been made between the deserving and the undeserving that there has been any measure of success. It must be admitted also that the present relations between employer and employee are far from satisfactory. It is impossible to say how much labor unions will accomplish in the improvement of these relations, for at present they are doing as much, if not more, harm than good, and are fast passing under the ban of popular displeasure. It must also be remembered that labor organizations are not finalities, but merely means to an end, and it is quite conceivable that they might entirely disappear and not interfere, save temporarily, in the progress of the masses toward bettering their condition. Just now, unless all signs fail, labor unions are entering upon a temporary eclipse, and are likely to have an opportunity to remedy in adversity some of the mistaken methods that they adopted in the days of their fatness.

PUBLIC INTERFERENCE IN PRIVATE BUSINESS.—It ought to be clear by this time to all keen observers that this subject has passed beyond the region of academic discussion and is fast becoming a matter of vital moment to every business institution. All large and successful businesses must necessarily be on a more or less public basis, and the determination of the public to regulate and inquire into everything in their province, and sometimes out of their province, is too evident to be overlooked. We have seen the beginnings of such things and it is impossible to say where the tendency will stop. Thoughtful men, however, will entertain the hope that in the end there will be gain and the subserving of the public good.

WHAT OF THE FUTURE?—It is always futile to attempt any definite or far reaching forecast of the future, and yet every successful business man must at least attempt to forecast the course of things in the near future and to manage his affairs accordingly. A mass of information on this subject is furnished in the voluminous advices given in the following pages from manufacturers and merchants, both wholesale and retail. While many take a more sanguine and a few a less sanguine view, the general consensus of opinion crystallizes into the following conclusions: That the financial sky is fast clearing and does not forebode any trouble; that the feeling of depression is giving way to modified cheerfulness; that the country generally, especially the South and West, is inherently sound and in good shape, and that while business is not to be looked for on the same scale as last year, there is reason to expect trade in good volume for the next six months, with probably a declining rather than an advancing market. The year thus opens under conditions which are far from unfavorable, and which justify an earnest prosecution of business interests, with the prospect that they will be rewarded with a good measure of success.

The sketch of the co-operative movement in Great Britain, by our London correspondent, given in another column, will repay careful perusal by those who are studying the various trade tendencies and the innovations in the old established methods of distribution, which are more or less obviously and generally changing the channels through which goods find their way to the

ultimate consumer. The extent to which the movement in question has established itself, especially among the working classes of England, fortunately finds no counterpart in this country, and our readers may look upon it in a somewhat theoretical way and free from the solicitude with which they would regard it if it came to them as it comes to merchants in Great Britain, to whom it is an actual, and in some cases serious, interference with their business. The trouble experienced by American merchants runs on somewhat different lines, and fortunately is not as yet anything like as grave a menace to their trade. The condition of things which prevails on the other side should have the result of making our merchants realize that their lot after all is one which calls for congratulation rather than commiseration. This is especially the case when it is remembered that besides the one form of co-operation which is described by our correspondent, there are the great stores patronized by the well to do classes in the community, which interfere with the marketing of goods through regular merchants. There are signs, however, that some of the principles which are operative in Great Britain are beginning to make themselves felt here. The matter is certainly nearly enough related to the interests of the manufacturing and distributing classes to justify candid and careful investigation.

Condition of Trade.

The exceptionally complete reports given in the following pages are the best exhibit of business conditions so far as they are related to Hardware interests. These reports come from manufacturers, jobbers and retail merchants, and thus indicate the way in which the situation is regarded by these classes, who have unusual opportunities for forming a correct judgment. The houses, too, whose letters are thus presented to the trade, are thoroughly representative in their various fields. Our correspondents who over their own names furnish regular semimonthly reviews of the general features of the market are leading houses occupying a commanding position, and represent the sentiment of the important trade centers from which they write. The letters from manufacturers, while given anonymously, are deserving of the most careful attention, as they are from gentlemen prominent in the lines with which they are identified, and many of them are of conspicuous ability and position. The communications from merchants in the various States and Territories, while coming from persons not occupying so prominent a position in the trade at large, are of great value and interest as reflecting conditions which exist in every section of the land. The well-known intelligence and ability of the retail Hardware merchant and his close contact with the consuming public give these advices, exceptionally detailed and comprehensive, a peculiar value which will be recognized by all who desire to take a broad view of the situation. The hopeful view taken by most of our correspondents is most noticeable. That the country is prosperous and full of the spirit of hope and enterprise is made evident. The less confident note which is sometimes sounded and the balanced judgment which is expressed are indicative of the conservatism with which the situation is regarded and the general recognition of the fact that business is not to be conducted under the high pressure which has characterized it for the past few years. The somewhat gloomy views which were expressed in some quarters, when there was apprehension of financial disaster under the stress of things in financial centers, has been succeeded by a greater confidence in the soundness of the commercial situation, unaffected by fear of financial disturbance. The jobbing trade, which hesitated for a time in the purchase of goods and began pursuing a very conservative course, are making active preparations for a good season's trade. There seems to be no reason why merchants should not buy in sufficient quantities to cover early requirements, and, indeed, order with more freedom in certain lines in which conditions point to an inadequacy in the supply, or possibly advancing prices. There is, however, a general feeling that the course of prices in Iron and its products will be toward lower rather than toward higher levels, but the indications, so far as Hardware and allied goods are concerned, point to a gradual and healthy progress in this direction. The fact that most lines of Hardware are held at moderate rather than high prices, with a prospect that manufacturers' costs will be very slow to diminish, especially in goods in which labor is an important element, does much to remove the apprehension of radical changes. The changes which are announced at this season are unusually few. It is noticeable that many manufacturers are giving more attention than heretofore to the securing of foreign business, and the present year promises to see an important extension of trade in that direction. With indications of a good, though somewhat diminished, home demand and an increase of trade with the outside world, 1904 opens with reasonable promise of a wholesome and satisfactory business.

Chicago.

(*By Telegraph.*)

The active buying for the new year has not set in, owing to the fact that many interests have not announced to the general trade their official prices for the year. The leading Builders' Hardware manufacturers have adopted their new schedule, which is a voluminous record of minor changes, some reductions and some advances. Winter goods are still moving actively, owing to the prolonged season of intensely cold weather and deep snows. December was the coldest twelfth month on record since 1876, and January, thus far, sees the cold weather unabated. Notwithstanding this spring and summer goods are beginning to show satisfactory activity. Jobbers who have covered their requirements in Wire Cloth are advising their customers to make their contracts early because of the probable scarcity of this product.

St. Louis.

(*By Telegraph.*)

A brief reference to some of the events of the year just closed of vital importance to the principal jobbing interests: The first of the year 1903 a large concern took possession of their new and magnificently arranged establishment, while later in the year our largest jobbers were seriously hindered in the conduct of business by labor troubles. Then, again, the serious floods in this section brought great losses and retarded all branches of business. The loss by death of I. W. Morton was another severe blow, an event much regretted in Hardware circles generally. With all the adverse factors taken into consideration, the figures of the year's business are said to make a most encouraging showing. Traveling forces visiting headquarters the past few days report generally a good business in sight in this territory, and it is thought that the character of the buying will be along the same conservative lines. Heavy lines do not show as favorable a record as Shelf Goods, as price changes in all classes of Iron and Steel supplies have steadily declined during the last half of the year, cutting dealers' profits to a minimum, and it is only the concerns which adopted the most careful methods of buying whose inventory of stock on hand presents a favorable showing.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—With the close of the year 1903 we are naturally inclined to take a retrospective view of the past twelve months, and we naturally infer that at this writing all good, intelligent wholesale business houses have completed their inventory, although the pricing and footing of the same may be postponed or delayed according to the judgment of the various houses. It is the system of some houses to defer closing this account in order to price according to any revised prices which may be adopted immediately after January 1, others price at the existing prices shown upon their cost book at the close of the year. It would be well and beneficial to all the retail trade if no year should be allowed to pass without adopting a system of inventory as well as charging up all well known bad accounts and striking a balance according to existing conditions. However, it is a well known fact that unfortunately all retail houses do not pursue this yearly course. This has come to the front when misfortune has presented itself or failure has taken place, when it has been found there has been a neglect in this very important particular. Guesswork is a dangerous experiment in so important and essential a matter.

We feel, however, that the year 1903 will be recorded as one of good mercantile trade. Again referring to the past twelve months, the writer asked two questions of a large dealer within the last few days, How was your trade last year, and how did it compare with the two previous years? Answer: Big, far exceeding any former year in our experience. Question. How about your profits, were they on a par with previous years? Answer: No, sir; the profits were far less even with our increased business than previous years, expense account greater, aggregate profits not equal, consequently net profits far less. The reasons given for both answers were stated as follows: There is a growing desire to extend business; this may have been perhaps in some cases beyond the limits of prudence and, therefore, in some cases with the result of diminished net profits, and while salaries of employees have increased each year working hours have gradually been diminished.

Personally we feel the above reasons may not have been all that could have been given. The last four or five years have been years of unexampled prosperity throughout our country. There may have been cases perhaps which were prompted by the wild example set in the enormous capitalization schemes which have been floated over our country, and in which one great argument made by these huge capitalizations was to concentrate a number of manufacturers interested under one head and thus extend business under one management. Is it not likely that some individual houses may have conceived the idea of "getting rich quickly," to be arrived at through extending their own individual business, and their extreme efforts in some instances reached beyond prudence or judicious judgment, cutting prices beyond manufacturers established rates may have been inaugurated, or perhaps salesmen added to their already large corps, some of whom had neither knowledge or experience in the line they represented? In cases of this nature many errors were naturally inevitable. Besides this no one house or one man can be a gladiator in prices, no matter where located, errors may have been accepted by competitors as prices given by employers, prices that never should have existed probably become fairly general, and when the wheel is turned around the house in fault in their attempt to correct prices may have found that the wheel had proceeded so fast and far that the machinery could not be reversed and the errors resulted in establishing a price. As a whole, however, we feel that both the manufacturer and distributor have dealt with the situation of last year fairly intelligently.

For the year 1904 we see nothing that should look discouraging; on the contrary the outlook seems more than fairly encouraging. It may have been noticed perhaps by your readers that many persons who have been asked to express their individual opinion of trade for the present year have evaded the question, fearing perhaps to make a mistake, and thus their reputation might be at stake. We see no reason why they should feel so. Those who have carefully watched the situation for the past few months should realize the causes of some declines which have taken place. The past four years of the speculative orgie, which lasted surprisingly long and culminated in the decline and practical collapse of the stock market, was an inevitable culmination sooner or later, and it may be that to-day there are quite a number of "poor rich men" who have learned a sad lesson and who now have a pessimistic feeling for the future. Fortunately this speculation has not extended to any great extent to manufacturing, business or mercantile circles.

The decline in prices on Structural Iron and the limit of the output in that particular kind of iron, as well as correlative assortments, including the decline in Pig Iron, as well as the reduced output, was, as stated by the highest authority, owing to the various strikes during the past six months, in which not less than 250,000 men and boys were prevented from doing their daily work. The atmosphere is now, we hope, largely cleared, but with the result that many thousand men and boys will likely start the first quarter of the year 1904 with less wages than they would have had had not the conditions named hampered the output of the product referred to.

The consumption of Pig Iron during the first nine months of 1903 exceeded all precedents, reaching the rate of nearly 20,000,000 tons for the year, but the last quarter's consumption have so far decreased as to reduce the output nearly 33 1-3 per cent.; but some part of this reduction may be attributed to the lessened demand from the railroads. The conditions of the money market have perhaps temporarily restricted continuation of extension and improvements which for the past two years have been a great factor with the iron industries. In these improvements our country has been vastly benefited, thousands of new cars have been added by the various railroads, bringing the number up to nearly present requirements, helping the wholesale and retail merchants as well as the manufacturers, all of whom have suffered from the delays which have caused great inconvenience from goods not reaching their destination promptly.

The money market has become more settled, and at the present writing we see nothing discouraging, but everything encouraging in the present outlook.

We take this opportunity of wishing you, the Editor of *The Iron Age*, and the patrons of your paper a happy new year, and may health and prosperity be your lot for the year 1904.

Louisville.

BELKNAP HARDWARE & MFG. COMPANY.—The new year opens up with favorable signs. No one seems discouraged as to the prospects. On the contrary, owing to the long withholding of orders, we believe that stocks are generally light over the country, and that the buying will be free when a start is once made. This is looked for by the middle of January, if previous observations are of any value.

Some articles last year suffered a decline, but not enough to do any serious damage to those whose factories were well placed, who were prepared to take care of the business. Some factories which had been built on boom ideas have to go through the usual sweating process to find out whether they are properly located or not. The present bases of price seem to be satisfactory to the trade. No claims of excess charges in any line. It is the agriculturist this year who is having his innings. There is nothing in the Hardware world at present to correspond with the 15-cent cotton, for example.

We have had an unusually long suspension of navigation on the Ohio, owing to low water and early freezes. In the meantime snow is accumulating at headwaters and along the various tributaries, so that we look for a good barge stage with the first thaw, and the January thaw is proverbial.

Politics are expected to absorb more or less attention in the coming year, but some new issue will have to be evolved in order to get up much feeling on either side. From here to the Gulf it would be pretty hard to discover any voter who is opposed to the Panama Canal.

Some are so thoroughly committed to the other route that a feeble stand is being made for that on personal grounds or interest. But the canal we must have, and more or less vigorous measures are always necessary in a great undertaking of this kind. It is hardly to be supposed that the world in its progress can entirely dispense with conquest. The recognition of Panama and the preparations to care for our interests across that important little strip of territory were peaceful conquests preparatory for the great move of uniting the oceans. Even the Daughters of the Confederacy have expressed themselves as gratified at the course of the President—witness their resolutions in several of the Southern States—and when we please the ladies all ought to go well. Believing that it will, we wish the readers of *The Iron Age*, manufacturers, jobbers and retailers each in their respective and worthy spheres, a Happy New Year.

Boston.

BIGELOW & DOWSE COMPANY.—The year just closed has been most eventful. With this company events came early, for in the month of January one morning we found our store in ruins, and our whole stock had been consumed in the night. The problem of making prompt shipment of all orders, accumulating an entirely new stock and rebuilding was solved in six months, and with only a slight loss in the aggregate year's sales.

The panic in the stock market, which reduced the value of railroad stocks 20 per cent. and industrials 40 per cent., has had no noticeable effect on the general trade of the country. Although the wheat, corn and oats crop was 10 per cent. less than in 1902, and the cotton crop 500,000 bales short, the higher prices have brought untold wealth to the farming community. The above conditions are quite unusual, if not unprecedented. A reduction in merchandise prices has usually followed a decline in stocks.

All through the year the prices of Hardware have been generally firm, and few reductions need be made in stock taking. The great factor in the steel and iron market has shown far sighted wisdom in adopting a conservative policy; first, in preventing unduly high prices for finished products; and, later, using its influence to prevent a panic market. The late meetings of the steel manufacturers in New York, and their decision to stand firm have had a great influence and removed many doubts from the mind of the buyer.

Throughout the year labor unions and walking delegates have been much in evidence and caused untold loss, more especially in the East, where no doubt of what would happen has deterred the capitalists from investing in many improvements that had already been planned. The acceptance of lower wages by the laborers indicates a change for the better for the coming year. The late court decisions, and the jailing of certain obnoxious walking delegates should have a salutary effect. Thus far there has been no decided movement among manufacturers to make general reduction in prices, and this meets the approval of the merchants who prefer an even market.

Stocks are low throughout the trade, and there is a disposition to delay ordering, fearing a decline in prices. Judging by past experience, this may be right and proper, if we did not consider the concentrating of manufacturing in fewer hands and the better feeling now existing among the various manufacturers, which makes it possible to control the market, now where it was not possible before. There is danger in waiting, as there will be unquestionably a large demand for goods the coming spring, and factories are not overstocked.

There is plenty of snow and ice throughout New England, and everything looks bright and happy for the new year. All express thanks and congratulations to *The Iron Age* for its good work the past year and best wishes for its future prosperity.

Cleveland.

THE W. BINGHAM COMPANY.—As we come to the close of what has been to all Cleveland jobbers a very prosperous and busy year (in spite of the dull spots that seem to have appeared in the business horizon of other sections of the country), we look forward to next year with a great deal of hope and anticipate a good trade from the beginning. We can truly say that we have been busy from start to finish of the year 1903, and we look back with pleasure and pride to the large amount of business that our customers have given us, and we trust that the Cleveland jobbers have given to the trade that have come their way such good service—that is, that their orders have been filled with such accuracy, promptness and completeness—as will merit a larger business from the same source in the future.

The Cleveland jobbers will enter the new year with orders for a larger amount of goods for future shipment—viz., season goods—than they had on their books at the same time a year ago. This is true of the orders for Sheet Iron, Lawn Mowers, Rubber Lawn Hose, Scythes, Snaths, Wire Cloth, Poultry Netting, Screen Doors and Windows, and many other goods for future shipment. Now that the United States Steel Corporation have made prices on Wire and Nails that will be good for the next 60 days, there will be a lot of inquiries and a great many orders placed for immediate shipment and shipment up into February. There are some goods that are altogether too low in price, if material and labor are considered—viz., Bolts, Carriage and Machine; Lag Screws, Plow Bolts, Sleigh Shoe Bolts, Stove and Tire Bolts—and it does not look as though there is much left for the poor manufacturer. Screws also are a commodity that seem to be cheap at the present prices. The advance in the list of Sandpaper, we understand, has come to stay—that is, the leading manufacturers in this line of goods say that they intend to maintain it. They have studied the situation very thoroughly and every item on the list in the make up of Sandpaper was carefully considered, and they say Sandpaper should have advanced years ago. In fact, they say that for the last 15 years the price on Sandpaper has been off. This being the case, those who were fortunate to get a good supply in at the old list have made a good thing.

On the whole, we look forward to a good business the coming year, and we believe there are many prices in the Hardware line that ought to be advanced, and some, possibly, that will change along about the first month in the year. We thank our friends in the trade for their generous orders, and wish them all a happy and prosperous New Year.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—We now have the usual relaxation from business on account of the Christmas holidays. Salesmen are now posting up and making selection of new samples, and in a few days will be out after spring orders for 1904, and the wheels of commerce will begin to turn, if we mistake not, with unusual velocity.

The Hardware jobbers of the South can scarcely review the business of the past 12 months without breathing a prayer of thanks to Him who controls our destinies for having guided us so successfully through a year which at its beginning seemed fraught with so many dangers. We entered 1903 with high priced iron, steel and Hardware. The most conservative thought we must have a general decline—in fact, a slump all along the line. The most optimistic among us did not hope to see prices of pig iron maintained; in fact, the decline in the price of pig iron which afterward came was on January 1 regarded as a certainty. There were, however, among us a few who took a hopeful view of the situation, believing that the great prosperity of our country would give us a demand for manufactured goods that would keep the factories busy and thus prevent any material decline in the price of Hardware. This view seems to have been nearly the correct one. The situation seems much more hopeful to-day than it did January 1, 1903. We now find that the manufacturers of Hardware have withstood the pressure brought to bear upon them to induce them to make a general reduction in price, on account of a reduction in the price of pig iron. We find steel manufacturers refusing to further reduce prices, a slight advance in Southern pig iron and a better feeling in Wire and Nails; in fact, a firmer tone to the market all around.

The purchasing power and the ability of the people

to consume were certainly never greater than at the present time. If our friends, the manufacturers, will give due attention to working off any small surplus of stock that they may accumulate through the export channels, we see no reason why we should not all have a good year's business in 1904 on a level plane of prices. Our prediction is that manufactured goods are going to receive more attention at the hands of the jobber in the future than in the past, and that in the next few years we will see a greater volume and larger variety of goods manufactured by jobbers than has ever been known in the past.

With an average crop of general farm products selling at good prices, and about 10,000,000 bales of cotton at this season's prices, you would question our sanity if we told you we expected poor trade in the South. There seems to be some doubt in the minds of the assemblage in front of the country store as to who put up the prices of cotton—general prosperity, Mr. Brown or the boll weevil. We suspect that they all had a hand in it, and we wish them, as well as *The Iron Age* and its good readers, a Happy New Year.

Portland, Oregon.

CORBETT, FAILING & ROBERTSON.—The Pacific Northwest has, on the whole, much to be thankful for in the year that is now closing, and the Hardware trade would be glad to discount at 2 per cent. for spot cash, and perhaps, if crowded, at 10 per cent., the coming year of 1904 as compared with 1903, either as regards volume or profit.

The past year has been spotted, both as regards output of products and prices. Some sections have done well, others poorly. Western Oregon and Western Washington have been more fortunate than Eastern Oregon and Eastern Washington. The low prices prevailing for cattle, hogs and sheep, together with a poor crop of wheat and low price, have worked a hardship in the eastern section. A better yield of farm products, high prices for hops, good fruit yield and satisfactory prices have favored the western section.

The first half of the year the lumber and logging business was good, the past six months bad, and the coming year does not promise well. This is an industry that means much to the Hardware trade. The slump in building operations in the East has cut off that demand, and now the mills have refused to renew export prices, leaving an open market that means a drop from $14 to $10 per 1000 for lumber, probably. This reflects on logging business, many camps having shut down, and with 150,000,000 feet of logs in streams tributary to the Columbia River and slack demand, more will in the future. A hop yield of 82,500 bales in Willamette Valley alone brought $3,000,000, and had it been possible to hold until the present time would have added $1,000,000 from that source. Mining has not met with the increased attention during the past year that this industry deserves. Much prospecting is going on, but capital is needed to develop claims that already show up well.

Locally the competition will be fierce the coming year. The Pacific Hardware & Steel Company are putting in a warehouse here, with offices for their travelers. Marshall-Wells Hardware Company's new six-story building is now up three stories, and with favorable weather should be under roof by March 1. With these stocks added to those now here and with a lesser demand for Hardware throughout the territory, we will all be out early for the traditional "worm." Prices now are badly demoralized, and the future will probably see them much lower.

Baltimore.

CARLIN & FULTON.—The calendar having marked the passing of another year, it would not be unwise to look back and consider whether the experiences of the last 12 months have been in any way unusual or worthy of remark, whether they have taught us any lessons, whether the present conditions are what we wish for, and whether the future, as well as we can read it, gives good reason for the realization of our hopes, or whether the solution of the problems it presents will be more difficult than ever.

It is an old saying that "Iron is the barometer of trade," and it is undoubtedly true that, resulting from or coincident with general business conditions, the Iron and Steel markets have been the exponents of those conditions with trade, either active or dull, good or bad. Of late years, through the evolution of the combination, the pool and the trust, and the alliance entered into between legitimate business and stock speculation, and the importance in the financial world of these overwhelming aggregations of capital engaged in manufacturing and in commerce, the Iron and Steel industries have also been burdened with the responsibility of all business, whether in raw material or in manufactured goods, whether in interstate or foreign commerce, as well as in the enormous transactions in bonds and stocks, both common and preferred. This statement cannot be disputed, and the responsibility is one imposed upon no other line of trade. Let the dry goods manufacturer advance or reduce his price, it is a matter only between the buyer and the seller, but let a Nail factory change its price or temporarily close its works, at once it is an item for the Associated Press dispatches throughout the whole world and the theme for discussion in the financial columns of every important paper in the country, and dependent upon this change of price, whether up or down, is the general opinion of the public as to whether all business is or will be good or bad.

The year 1903 opened auspiciously for trade. The general market was strengthened by the advance in January of $1 per ton in Wire and Nails. The railroads were all busy, indicating a general distribution and exchange of merchandise and staples all over the country; labor was generally well employed, or, if idle, was so voluntarily; stocks of goods throughout the country were not larger than necessity demanded, the average merchant believing it good policy to buy conservatively, there being little of speculative value in goods. It was the experience of nearly every one, we think, that the spring season was good, but unfortunately, as the summer approached, there began, in many places, the troubles with labor, which culminated in a complete paralysis for a long time of building operations, and, of course, a greatly decreased demand for certain material. Then was seen the misfortune of having the interests of the Stock Exchange dominate the policies of some corporations and, with the decline in market values of industrial stocks, the questions being asked whether the values of merchandise were in accordance with legitimate demand and supply or fixed by the necessity of dividends on the issues of watered stocks; business halted, or rather hesitated, for there seemed to be something pending, perhaps some radical reductions in the great staples; no one knew exactly what, only every one felt it advisable to be cautious, to keep close to the shore and expect perhaps a storm.

But the daily needs and consumption of this nation are immense and they must be supplied. The carpenter, who wants his Saw; the wheelwright, who needs his Bolts; the laborer, who must have his Shovel, and the farmer, who requires his Scythe, cannot wait for months to see whether he can save a cent or two in cost, and meanwhile lose dollars in wages; and so trade has continued throughout the fall, stocks being diminished gradually, orders being placed conservatively, and the hand to mouth policy being pursued by every one. Now the end of the year has come, and there have been some reductions in prices, but nothing radical has occurred. There have been some concessions made gradually in Nails and Wire, and some other few heavy goods, but no one has suffered, and on the other hand there have been some advances which will help to offset the depreciation in stocks on hand.

Now, in regard to lessons learned during the year, each one can best determine for himself whether another year's experience in business has been fruitful of good results. We think among the lessons learned is that in these days of railroad development there is neither a necessity nor an advantage in the large purchases which were, in former times, the rule when the productive capacity of the manufacturers was limited and many markets were almost inaccessible by improved

methods of transportation. Another lesson has been taught the merchant, large or small, who overbuys through anxiety to make a record and magnify his importance to the manufacturer, hoping to sell his surplus stock in some open market, with the result that he finds it hard to have a low price for his competitor's customer and a high price for his own, and that the result is generally the entire stock is sold at the minimum price at a lack of profit for fear of carrying it over.

Among the problems of the future is the conversion of the Post Office Department into a freight carrier, through the Post Parcel bill, lately introduced into this Congress, and which, if passed, will put the Government into direct competition with the transportation lines of the country and enable the large department stores in the great cities to reach every individual direct throughout the length and breadth of this country, to the detriment of the local retail dealer, who is entitled to the support of his community, and which he would have, no doubt, provided the mails are not converted into express companies. Another problem is that of labor, but having already transgressed the limits to which we are entitled in your columns, we will merely say that we think all questions which arise will be settled by the common sense of our people, and that the future is full of hope and bright expectations.

We wish you and all your readers a most happy New Year.

NOTES ON PRICES.

Wire Nails.—The outlook for the coming year is encouraging, based on the amount of business which has been booked at the mills for future delivery. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots	$1.85
Retailers, carload lots	1.90
Retailers, less than carload lots	2.00

New York.—Local demand is light, owing to weather conditions, which are unsuited to outside work. Quotations are as follows: Single carloads, $2; small lots from store, $2.10.

Chicago, by Telegraph.—The leading interest reports a continuation of the activity of the last two weeks at the new price of $2, base, Chicago, to jobbers in car lots, $2.05 to dealers in car lots and $2.10 in less than car lots.

Cut Nails.—The Cut Nail Association hold a meeting at Pittsburgh January 7. What action will be taken regarding prices at that time has not been forecast. Recent indications point to a slight shading of official quotations on desirable orders. Quotations are as follows: $1.90, base, in carloads, and $1.95 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—Demand has been light during the week, owing in part, to extremely cold weather and a heavy fall of snow. Quotations are as follows: Carloads on dock, $2.04½; less than carloads on dock, $2.12½; small lots from store, $2.20.

Chicago, by Telegraph.—It is understood that the Cut Nail Association will meet Thursday this week. Sales made at the present time are coupled with a guarantee of prices. The demand is naturally very light, because at the present schedule Cut Nails are quoted considerably higher than Wire Nails in the Chicago market.

Barb Wire.—Current demand continues light, and is likely to contine so for some time. Contracts for spring delivery are expected to be placed after the first of the year. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots	$2.15	$2.45
Retailers, carload lots	2.20	2.50
Retailers, less than carload lots	2.30	2.60

Chicago, by Telegraph.—The character of orders and inquiries being received by the leading producers and the number of contracts closed for spring delivery indicate that this will be an active season in Barb Wire. Farmers have harvested good crops, and have marketed them at relatively high prices. Already there is talk of a possible shortage of supply. Price to jobbers in car lots is $2.30, Chicago, for Painted and $2.60 for Galvanized, the retailer paying 5 cents per 100 pounds advance for car lots and 10 cents above that price for less than car lots. Jobbers are paying for Staples $2.15, Chicago, for Plain and $2.55 for Galvanized. Retailers, $2.20 for Plain and $2.60 for Galvanized, with an advance of 10 cents per 100 pounds in less than car lots.

Smooth Fence Wire.—Demand is not heavy, and mills are guaranteeing prices against unfilled portions of contracts. Prices are somewhat irregular, but the following quotations fairly represent the market, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads	$1.80
Retailers, carloads	1.85
Less than carloads	1.95

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12&12½	13	14	15	16
Annealed	Base.	$0.05	.10	.15	.25	.35	.45	.55
Galvanized	$0.30	.35	.40	.45	.55	.65	1.05	1.15

Chicago, by Telegraph.—The leading producers state that the demand for this product is very satisfactory, and as good as they ever expect at this time of year. Contracts are being placed for considerable tonnage. Prices rule, as follows: Base sizes, Nos. 6 to 9, are now $1.90 per 100 pounds in car lots to jobbers, f.o.b. Chicago, and $2 on less than carloads either from mill or store. Galvanized Wire is 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

Cordage.—Demand is moderate, but satisfactory for the season. The market is devoid of any features of especial interest. Quotations on the basis of 7-16 inch diameter and larger are as follows: Pure Manila, 11½ cents; second-grade Manila, ½ to 1 cent per pound lower; Pure Sisal, 9¼ cents; Mixed Sisal, 8¼ cents per pound. These quotations are subject to a rebate of ¼ cent per pound to carload buyers.

Builders' Hardware Prices.—The leading manufacturers of Builders' Hardware have issued revised prices on an agreed basis under date of January 1, 1904, founded on minimum net prices, covering a more comprehensive classification than has ever been attempted before, an undertaking that has been in progress for a large part of the past year. Builders' Hardware, in its numerous ramifications, is doubtless the most complex line handled by Hardwaremen, aggregating in one representative company's catalogue approximately 100,000 items in styles, sizes, finishes, &c. It has been largely with a view to simplifying and standardizing these goods as far as possible that this enterprise has been undertaken by one central organization so far as net prices are concerned, each manufacturing interest revising its lists and discounts to harmonize with the predetermined minimum prices. While the equalizing and leveling process has involved almost countless changes, reducing some costs and advancing others, the net result, it is claimed by a prepresentative manufacturer, will not greatly alter net results to the buyer of an average bill of goods, although in many instances the inequalities have been important. Some of the manufacturers by persistent, energetic work are in a position to supply customers with new lists and discounts, each after his own methods, but owing to the mass of detail involved, while outstanding prices were withdrawn January 1, 1904, the new prices cannot be furnished until later. In the meantime orders received after January 1 will be executed in conformity with the new scale, and quotations will be made to the trade on application, for guidance in placing orders in advance of the receipt of the new price-list.

The Stanley Rule & Level Company.—The Stanley Rule & Level Company, New Britain, Conn., and 107 Chambers street, New York, have issued a discount sheet dated January 1, 1904, applicable to their catalogue No. 28. The changes are immaterial, the base discounts on

Jack Plane and Fore Plane Handles being now 30 per cent. instead of 40 per cent., Saw Handles 35 per cent. instead of 40 per cent. and Assorted Patent Peg Awls 20 per cent. instead of 50 per cent. discount.

Glass.—As stated last week the formation of the Manufacturers' Window Glass Company has been abandoned. The scheme was given up because the necessary number of manufacturers' signatures to make it a success, could not be obtained. The trade are awaiting to see what action the manufacturers will take regarding prices. Local demand is very light, and there appears to be no regular quotations.

Oils.—*Linseed Oil.*—The price of flaxseed has again been forced up by the largest buying interest, presumably in hopes of stimulating a demand for Oil. No change has been made in prices, and it is considered by some that an advance in Oil could not be permanently maintained, owing to the large surplus of seed. Demand is confined to small lots. Quotations are as follows: City Raw, in lots of five barrels or more, 37 cents; in lots of less than five barrels, 38 cents per gallon. Out of town and Western Oil, 35 to 36 cents per gallon.

Spirits Turpentine.—Buying in the local market is confined to small lots. Quotations are as follows, according to quantity: Oil barrels, 59¼ to 59¾ cents; machine barrels, 59¾ to 60¼ cents per gallon. Reports from the South speak of higher prices before a new crop.

PITTSBURGH NAIL AND WIRE MARKET IN 1903.

THE Wire and Nail trades in 1903 followed much the same lines as other forms of finished material. The year opened with Wire Nails selling at $1.85 to $1.90 in carloads; Cut Nails, $2.05; Galvanized Barb Wire, $2.50; Painted, $2.20, and Plain Wire, $1.80, base, all in carload lots at mill. At this time deliveries of Nails and Wire were hard to obtain, owing to congested condition of the railroads. On January 14 the price of Cut Nails was advanced 5 cents a keg, or to $2.15. The market was without special change until February 20, when the American Steel & Wire Company and other interests advanced Wire and Wire Nails $2 a ton. This advance was made on account of heavy demand and high prices of Steel. No further changes were made in prices until March 25, when the price of Cut Nails was advanced 5 cents a keg. Demand for Wire and Nails in the first four or five months of the year was exceedingly heavy, and prompt shipments were very difficult to obtain on account of scarcity of Steel, and also by reason of the car situation. In May the supply of cars was better, Steel was more plentiful, and the mills were able to make reasonably prompt deliveries. In June demand for Nails and Wire fell off very much, but prices remained without change, and were fairly firm. In July a large number of plants closed down for repairs, and this gave the mills a chance to work off to some extent an accumulated stock of Wire and Nails, which were very heavy. In the last three or four months of the year demand was only fair, and the trade was pursuing the policy of placing orders only for small lots and actual needs. This condition continued up until December, concessions in prices being made both on Wire and Nails. On October 29 a reduction of 25 cents a keg on Cut Nails was made, the former official price of $2.15 having been shaded to considerable extent for some time. In December, the leading interest made a reduction in price of Nails and Wire to the basis of $1.85 for Wire Nails, $2.45 for Galvanized Barb Wire, $2.15 for Painted and $1.75 for Plain Wire. These prices were in force at the close of the year, but demand was only fair. In the early part of December the price of Iron Cut Nails was reduced to 10 cents a keg, and at the close of the year both Steel and Iron Cut Nails were being quoted at $1.90, base, in carloads, but this price was being slightly shaded. The outlook for the Wire and Nail trades for 1904 is regarded as very good, and an advance in prices of Wire and Wire Nails during January would not be surprising to the trade.

F. E. MYERS & BRO.

TWENTY-FIVE YEARS ago, January 1, 1879, F. E. Myers and P. A. Myers formed the partnership of F. E. Myers & Bro., Ashland, Ohio, who have since become so prominent and successful as manufacturers of Pumps, Hay Tools, &c. Previous to that time P. A. Myers had been employed by his brother as salesman in his Agricultural Implement business. The Messrs. Myers have been admirably adapted for the development of the business; the one has ably supplemented the other in his special department, and they have always worked harmoniously together. With this intelligent and energetic co-operation the business done by the firm has grown until their products are now sent all over the world, and 500 men are constantly employed by them in their various departments. F. E. Myers was interested in the early inception of the National Association of Agricultural Implement and Vehicle Manufacturers, and has always given this organization, which has been of so much benefit to manufacturers in these lines, his earnest and enthusiastic support. For two years he was at the head of the Freight Committee, he served another term as chairman of the Executive Committee, and now he is the president of the association. P. A. Myers for a number of years has been the chairman of the important Committee on Patents.

TRADE ITEMS.

ON and after January 1 John H. Graham & Co., 113 Chambers street, New York, will act as general selling agents for the Irvington Mfg. Company, manufacturers of Drop Forged Tools, Irvington, N. J., and will receive all orders and make all quotations. Goods will be billed through them, and to them all remittances should be made.

THE CHICAGO RETAIL HARDWARE DEALERS' ASSOCIATION have protested against the proposed city ordinance requiring each storekeeper handling Fire Arms to pay an annual license of $50. The association condemn the measure as unnecessary and the proposed tax as oppressive. They claim that the ordinance covers ground already covered by statute, and that there is no good reason why a license fee should be paid. The matter has not yet been settled.

C. B. BARKER & Co., 93 Reade street, New York, having sold the Bicycle branch of their business to John S. Leng's Son & Co., will still carry on their regular business in Sewing Machine Needles, Oils and Supplies in the same building, occupying the upper floors as heretofore for this part of the trade.

THE ELLIOTT MFG. COMPANY., manufacturers of tinware, Warren, Ill., inaugurated a series of annual banquets to their commercial travelers Wednesday evening, January 6. The banquet was served at the hotel Warren. An address of welcome was made by W. F. Conyne, the president of the company, to which F. L. Anderson responded in behalf of the traveling salesmen. Addresses on various phases of the business as seen by the man on the road were made by J. J. Walton, P. T. Hicks, T. C. Shaw, F. W. Hewitt, L. H. Sawyer, P. W. McKibben and others.

JAMES C. LUTTRELL of the Hardware firm of S. B. Luttrell & Co., Knoxville, Tenn., was the recipient on the 30th ult. of handsome gifts from W. J. Oliver of that city and associate railroad contractors. The presents consisted of a sterling silver tea set and a gold headed cane.

THE NATIONAL SWEEPER COMPANY of Marion, Ind., are preparing to make an unusually handsome display at Grand Rapids, Mich., during the forthcoming Furniture Exhibition. Following their usual custom, this exhibit will differ materially from any previous one, and will embody new features in their line of Carpet Sweepers. The National Sweeper Company have also arranged for a permanent display of their line at the Manufacturers' Exhibition, 1411 Michigan avenue, Chicago, Ill., where all dealers are invited to make their headquarters when they visit that city.

HARDWARE AT THE OPENING OF 1904.

The Rubber Goods Trade.

THE year just closed was one of the most active ever known in the Rubber industry, not only in the United States, but in the whole Rubber manufacturing world. That is, the consumption of raw material was greater than in any former year, and consequently the production of goods was larger. From the fact that, on the whole, higher prices prevailed for Rubber goods, and that no indications exist of larger stocks in dealers' hands, it is evident that the consuming demand also has been exceptionally large. For a year or more the factory demand for crude Rubber has quite equaled, and at times exceeded, the rate of production, resulting in a higher cost of the raw material. Thus, the import value of 51,000,000 pounds of crude Rubber imported in the United States during the first 11 months of 1903 was $6,250,000 greater than for the 50,000,000 pounds imported during the same period of 1901. This difference must be accounted for in the increased selling prices of Rubber Goods, or lessened profits of manufacturers, or both.

HIGHER PRICES.—At present the cost of the cotton fabrics employed in Rubber Belting, Hose, Tire Covers and the like is also materially higher, and the same is true of certain mineral and other ingredients used in compounding Rubber, with the result that a higher average price has been demanded by Rubber manufacturers for their products. They have been aided in obtaining an advance by reason of the active demand for goods which has prevailed during most of the past year, though it is asserted by the manufacturers, as a rule, that their profits for the year have been less than in some recent years, compared with the volume of trade.

FINANCIAL.—There have been no failures of moment in the trade, however, and the leading firms in the mechanical goods branch—those producing the lines of interest to the Hardware trade—have announced the customary dividends for 1903, ranging from 6 to 8 per cent. During the latter part of the year there was a lessened pressure for Rubber Goods in this field, but this is usual at the end of the year, and apparently no fear exists that 1904 will not compare favorably with 1903.

TIRES.—The production of Rubber Tires continues to be the most important single feature in that branch of the Rubber industry with which this review has to deal. The manufacture of motor cars of various types in the United States has increased at a notable rate. Estimates which appear credible fix the number of such vehicles produced in 1902 at about 20,000 and in 1903 at about 25,000, while a still larger output is expected in 1904. A great many vehicles were manufactured before 1902, so that the whole number now in the country must equal 50,000, representing a total initial cost for Rubber Tires—putting the cost per vehicle at the low average of $140—of $7,000,000. At least one-half of the Tires will have to be replaced in each year, the replacement trade gaining constantly with the increase in the number of vehicles produced, so that the annual Motor Tire bill of the country is becoming very large. There are indications that the Hardware trade will figure to an important extent in distributing these Tires, in connection with other Automobile Sundries and the making of minor repairs.

BICYCLE TRADE.—By the way, the Bicycle trade appears to be improving. The total number of wheels marketed for two years past was probably greater than has been generally appreciated, though on account of the policy pursued the manufacture is now admitted to have been unprofitable. The trade having now been placed on a new basis, an increasing sale of Bicycles seems likely, at a higher price level, and the Hardware trade may again be seen handling wheels as well as Tires, and at a profit.

Fortunately the cheaper grades of Tires, which helped at one time to demoralize the Bicycle trade, seem now to have been permanently retired. And the makers and users of automobiles also seem to be adopting the idea that low priced Tires are not always economical, so that this year is likely to witness the highest price level yet seen for Rubber Goods for vehicles—a condition which should allow a better margin on such goods for Hardware houses.

AUTOMOBILE TIRES.—As for the styles of Automobile Tires, it is apparent that the coming national Automobile shows at New York (in January) and Chicago (in February) will reveal a decided preponderance of the "Clincher" type. These are detachable, or double tube, Tires, the inner or air tube being protected by an outer cover, easily removable in case of puncture. This outer casing is held in place by means of thickened and stiffened edges, engaging in rims of suitable shape in such way that when the Tire is inflated it is firmly held on the wheel, without requiring any further mechanical devices. This type of Automobile Tire is well nigh universal in France and Germany, and in increasing favor in Great Britain.

BELTING, HOSE, &C.—The trade in Rubber Belting, Hose and Packing has continued active during the year, as is always the case in periods of industrial development. Special mention may be made of the growing use of Conveyor Belts of Rubber for use in handling the products of mining and many industries, and of grain in elevators. The idea has been introduced abroad, and many Conveyor Belt outfits have been exported in connection with other mining equipment. The same is true of special makes of Rubber Hose for pneumatic tools, for use in mining and shipbuilding, and for many other purposes.

HORSESHOE PADS.—The use of Rubber Horseshoe Pads is becoming more general. Rubber Tiling, for the flooring of public places, likewise is a new application of Rubber in growing demand. Both of these lines may yet become of interest to the Hardware trade. There is a steady growth in the volume and extent of the manufacture of Sporting Goods which involve the use of more or less Rubber, and already the Hardwareman figures liberally in the distribution of these.

BOOTS AND SHOES.—The heavy snowstorms which ushered in the new year will greatly favor the Rubber boot and shoe trade. The production of these goods has been exceptionally large since the beginning of the season, calling for a large amount of Rubber, and helping to keep up the price of the raw material, as well as of cotton fabrics. A mild winter would result in large stocks of Rubber footwear in the hands of dealers next spring and reduced activity of the factories next summer, but no such condition is now looked for.

NEW FACTORIES.—There is a steady increase in the number of Rubber factories, and a tendency to locate new ones in trade centers which hitherto have been without local sources of supply for Rubber Goods. These new concerns tend to neutralize any tendency toward "trust" movements in the industry; besides, their competition keeps prices of products at a lower level than might otherwise prevail. In many cases a local factory offers an advantage in respect to filling orders for goods on short notice, with a possible saving in freights on heavy goods. At the same time, the older concerns, with an established reputation for their goods, will find many of their customers disinclined to transfer their orders to new and untried factories.

TENDENCY OF PRICES.—Too many elements enter into the making of prices for Rubber Goods for any detailed statement of the present market to be given here. It must always be the case that a demand for a certain line of Rubber Goods at a given price will find firms in the trade ready to meet it. During 1903, however, as already indicated in these pages, the tendency of prices was upward, and while a part of the advance, which progressed steadily to September last, may have been lost in the closing weeks of the year, the present costs of production and the generally active demand for goods combine to hold selling prices higher than one year ago by 7 to 10 per cent., and more on goods not kept generally in stock.

Tarred Roofing and Building Papers.

An unprecedented demand characterized the opening of the year, at an average price, for all lines, higher than ever before. Rozin Sized Sheathing advanced $3 a ton the last of January, and the last of March the price of Single Ply Tarred Roofing Felt was advanced from $1 to $2 a ton, according to the distance from manufacturing points. Prices continued with little deviation into early fall, the schedule prices of the manufacturers being fairly well maintained. In this class of goods the situation, more particularly in the East, is such that no material change in prices is anticipated during the coming year. The trade agreements now in existence are likely to remain in force, as one of the competing plants was recently burned and another, the Susquehanna Roofing Mfg. Company, Cly, Pa., it is rumored, have recently given in their adhesion to the trust. The market on Stone Surfaced Roofing, however, is an open one, and appreciably lower prices are likely to develop. The new Roofing Material factory of the Barber Asphalt Company, Maurers, N. J., will soon be in operation, and while any serious business innovation of this prominent concern is an important factor and likely to prove an active competitor of the Coal Car trust, it is believed by some of the trade that it is not likely to affect seriously the market price of Coal Tar goods, so long as the Asphalt Company confine their operations to the manufacture of Asphalt materials only, owing to much higher cost of Asphalt raw material. In Rosin Sized Sheathing, Deadening Felt and Building Papers there have been a number of new mills erected, which may influence the market, unless the demand is greater than present prospects indicate. The situation in the West is somewhat different, prices there having been fixed more by a large demand than because of trade agreements. The situation in that important territory is ascribed to good crops at high prices and a lesser proportion of labor troubles.

Shovels and Spades.

The low prices established the last of 1902 by the Shovel Association gave the outside manufacturers a good deal of trouble, as those who were not favorably situated were unable to compete and make anything like a living profit. The volume of business was large, and manufacturers generally experienced some difficulty in making deliveries on account of scarcity of materials and especially handles. In November the association was dissolved. Prices, which were already uncomfortably near the cost of production on goods most largely sold, continued substantially as before. The leading interests are endeavoring to secure the business of the jobbing trade by means of a rebate to be paid to those who purchase only from their factories. A good many of the houses are accepting it. The trade in general have been placing orders with caution, but at this time there is more confidence that prices will be maintained than there was a few weeks ago.

Axes.

A good deal of interest was felt in the trade early in the year as to the outcome of the effort to consolidate the Axe and Edge Tool interests, but after holding many meetings the effort proved unsuccessful. The market in March opened at about the prices at which contracts were taken in 1902, but irregularities and lower prices soon developed, and the bulk of the season's business was booked at unpleasantly low figures. The manufacturers have, however, recently been working together and refrain from quoting prices for shipment in 1904. It is expected that about February 1 the new prices will be announced, and while there is no certainty that the plans of the manufacturers will be carried out, it is regarded as probable that the market will be put in even a stronger position than at present.

Hickory Handles.

On January 10 the Hickory Handle Manufacturers' Association adopted a schedule of specifications designed to insure a uniform grading of Handles shipped by each member, applicable to the list of prices adopted by the same association December 22, 1902. An advance in price of about 10 per cent. was made by the principal manufacturers about the middle of February. A new price-list of Turned and Shaved Handles, including Hammer, Hatchet, Axe, &c., which went into effect on April 20, was in the nature of an advance. The diminishing supply of Hickory, which is produced only in this country and Canada, is causing the manufacturers solicitude and strengthening the market prices of the Handles and other goods in which the wood is used.

Carriage Bolts, Machine Bolts, &c.

The year opened with irregularities in Carriage Bolts, some concessions being made by manufacturers. The completion in the market of Bolts which departed from the regular standard became so important a factor in the trade that about the middle of March manufacturers reduced the price of Bolts, ⅜ x 6 inches and smaller, to about 10 per cent. below the other sizes. The market since has shown no improvement in the way of prices. The trade, however, are hoping that a quickening demand will soon give a firmer tone to the market.

Shot.

The Shot market has been an advancing one, Shot now being 20 cents per 25-pound bag higher than in the spring. The strength of the lead market has justified the strong position Shot has held. A salient feature of the market is the fact that nearly all the Shot towers are under one control, while separately quoting goods and carrying on their business.

Solid Box Vises.

An advance of about 15 per cent. was made in the price of Solid Box Vises early in April. The understanding which for some time had existed among manufacturers of Blacksmiths' Vises terminated late in the fall and the market on this line of goods became an open one. As a result of this and of the reduced cost of raw materials, lower prices prevail.

Zinc.

Owing to a succession of reductions in price during November and December, the price of Zinc is $1 less per 100 pounds than it was after the advance in price was made on April 7.

Flint and Emery Paper and Cloth.

In February manufacturers of the above lines made an agreement to maintain prices on a somewhat higher level than before, and established uniform discounts. A revised price-list went into effect November 23, which was higher than the list it superseded but subject to the same discounts as the former list.

Wood Screws.

After a long period of demoralization in the price of Wood Screws, all the manufacturers came together again in a strong organization in March, and new discounts were adopted, which were a material advance on the low prices which had been current. A revised price-list of Wood Screws was adopted by the manufacturers on July 22, a number of changes being made for the purpose of correcting inequalities which had for a long time prevailed in the list. No change in discounts occurred.

Casters.

A revised list was adopted by some of the leading manufacturers of Casters about the middle of January.

Conductor Pipe, Eave Trough, &c.

On April 23 the prices on Conductor Pipe, Eave Trough, &c., were advanced. During the last of November prices on the above line were reduced, and some changes in classification of territory were made by the manufacturers.

Axles.

During the spring months the market for Axles was not in a very satisfactory condition, owing to the fact that demand was disappointing. This was attributable to the overstock of Vehicles and materials for them which had accumulated during the past season. Business was quiet during the closing months of 1903, but prospects for the new year are regarded as improving.

Galvanized Pump Chain.

The cost of the raw material contributed to the strength of the Galvanized Pump Chain market, and

slightly higher prices were announced by leading manufacturers early in the year, and these have in general been well maintained.

Augers and Bits.

The manufacturers of Augers and Bits announced higher prices in April, putting this line in a better condition than for some time previous. The subsequent course of the market has, however, been unsatisfactory and prices are irregular.

Agricultural Handles.

Owing to the increasing scarcity of second-growth ash, of which Farming Tool Handles are made, the market during the year has been an advancing one, and prices are considerably higher than they were two years ago.

Bright Wire Goods.

There have been some irregularities in the prices of Bright Wire Goods, and the market has fluctuated somewhat during the year. In January a new list, embodying higher list prices and correcting inequalities, was announced. This year closes with the market irregular and low.

Freezers.

There was a disposition on the part of the retail trade to purchase Freezers early last season, and orders were consequently received by manufacturers in good numbers early in April for considerable quantities of goods. Prices were substantially the same as in 1902, notwithstanding the increased cost of raw material in some lines in the early part of 1903. Manufacturers are working in harmony and the market is in excellent condition.

Wire Rope.

Revised quotations on Wire Rope to consumers were announced in April. Recently the market has been uneven, owing principally to competition of outside manufacturers.

Wrought Iron Washers.

In the latter part of February a slight advance was made by the manufacturers in the price of Washers. These goods were more or less scarce during the spring months, owing to large demand and trouble in getting raw material. In the fall lower prices developed.

Sash Weights.

Early in the year the Sash Weight market assumed an excellent condition, orders being plentiful, and with a cordial feeling among manufacturers, prices were well maintained. Some manufacturers had difficulty in keeping abreast in deliveries on account of the scarcity of fuel. Throughout the remainder of the year prices were pretty well maintained in the East, but in the West there was a good deal of irregularity during the fall months, owing to competition between manufacturers, and prices were forced down to a low level, with a good deal of unevenness in the various markets.

Tacks.

During the year the Tack market was in an unsatisfactory condition, with a good deal of irregularity in prices. Competition between the manufacturers was active, and there was a good deal of strife for orders. This is one of the lines in which conditions are far from ideal.

Chain

Owing to the fact that a number of manufacturers entered the field in 1902, the prices on Coil and other Chains have been somewhat uneven, and concessions have been more or less freely made during the past year, so that prices are quotably lower than a year ago.

Plumbs and Levels.

The revised lists on Plumbs and Levels announced by the manufacturers early in the year eliminated the inequalities in list prices which had developed through a long term of years, and thus promoted the convenience of the trade.

Planes.

Early in January an advance of 5 per cent. in the base discount was made by the manufacturers of Wood Planes. The prices then adopted have since remained in force, being quite steadily maintained. The increasing cost of lumber has contributed to this.

Copper and Brass Goods.

Advances in Ingot Copper after the first of the year resulted in a succession of advances in Copper and Brass Goods during March and April. The early part of August saw reductions in these goods, owing to the lower price of Copper, which was followed in October by still further reductions in prices.

Flint and Emery Paper.

The manufacturers of Flint and Emery Paper and Cloth adopted a revised list on the above lines, which went into effect November 23. The revised list prices were subject to the same discounts as the former list.

Poultry Netting.

On October 22 the manufacturers of Galvanized Poultry Netting agreed upon their prices for the coming season, making them the same as those which prevailed during the preceding year. There thus continues to be the usual differential of 5 per cent. between Netting galvanized before weaving and that galvanized after weaving.

Screen Wire Cloth.

During October the associate manufacturers of Screen Wire Cloth determined the quotations for next season's business, making the price 10 cents higher than for last season. Since that time the burning of one Screen Wire Cloth plant and the improvements under way in another factory have seriously curtailed the production in the year's output. These conditions have given the market a firm tone.

Heavy Hammers

The manufacturers of Cast Steel Sledges and Hammers made a number of changes in the list prices on these goods, under date of October 1. By the middle of the following month lower prices were made by the manufacturers in view of the reduced cost of the raw material.

Steel Goods.

The associated manufacturers of Steel Goods announced prices for the coming season the last of September. The same general scheme of list prices and discounts as were in use was adhered to, but a slight diminution was made in most of the base discounts, and the extra discounts given to the two classes of the jobbing trade were also slightly reduced.

Scythes.

The manufacturers of Scythes reached an understanding the last of August in regard to prices for next season, which were substantially the same as for the preceding season. The market, however, soon became irregular, and prices which were materially below those scheduled by the manufacturers were developed under the stress of active competition.

SALE OF WM. WILCOX LOCK BUSINESS TO S. R. SLAYMAKER.

WILLIAM WILCOX MFG. COMPANY, Middletown, Conn., have sold their entire Padlock and French Rim Dead Lock business, including tools, balance of stock, good will, &c., to S. R. Slaymaker, Lancaster, Pa., manufacturer of Padlocks, Night Latches and Hardware Specialties for whom John H. Graham & Co., 113 Chambers street, New York, with San Francisco, London and Copenhagen branches, are general sales agents. The Wilcox Mfg. Company are said to have been the only makers in the United States of French Rim Locks, their line of Padlocks having been recognized as a leading line in this country for many years. This addition to the Slaymaker line puts the latter in a position to execute orders for almost every type of Padlock.

Whiting & Bushnell, dealers in Hardware, Stoves, &c., Port Huron, Mich., have dissolved partnership, Mr. Bushnell retiring. John P. Whiting will continue under his own name.

RETAIL HARDWARE ORGANIZATIONS.

DURING the past year the retail Hardware association movement has continued to grow in strength and influence, most of the State organizations being in a very prosperous and promising condition, and reporting a steady increase in membership and greater interest and loyalty on the part of the members. Those not affiliated with the associations have also evinced more concern than heretofore in the objects and work of the associations, and still further accessions to the membership rolls are confidently looked for as the time approaches for the annual meetings, most of which are held during the next two or three months, February being this year, as heretofore, the banner month. Many of the associations are considering the question of mutual fire insurance, which is in successful operation in several of the States, this being regarded as a very effective means of attracting new members in view of the material saving which is thus secured in the expense of insurance. The subject of the Parcels Post bill, another and more vigorous effort to pass which will be made before Congress at the present session, is now engaging the best attention of the officers of the various associations, and it promises to be the principal topic for discussion at the forthcoming annual gatherings. Following are the dates of the annual meetings to be held during the next few months:

TENNESSEE, January 14 and 15, Knoxville.
NORTH DAKOTA, January 27, 28, 29, Grand Forks.
WISCONSIN, February 3, 4, Milwaukee.
NEBRASKA, February 9, 10, Omaha.
IOWA, February 10, 11, 12, Des Moines.
COLORADO, February 15, Denver.
INDIANA, February 16, 17, 18, Indianapolis.
PENNSYLVANIA, February 16, 17, Williamsport.
ILLINOIS, February 23, 24, East St. Louis.
OHIO, February 23, 24, 25, Cleveland.
MINNESOTA, February 24, 25, 26, St. Paul.
CALIFORNIA, March 2, 3, San Francisco.
NEW YORK, March 8, 9, 10, Rochester.
NATIONAL, March 15, 16, 17, Indianapolis, Ind.
INDIAN TERRITORY, May 10, Oklahoma City.
ARKANSAS, June 14 and 15, Little Rock.
MICHIGAN, August 10, 11, Grand Rapids.

NORTH DAKOTA RETAIL HARDWARE ASSOCIATION.

The membership of this association now exceeds 150, as compared with 135 at their last annual meeting. This represents a good percentage of the regular Hardware merchants of the State, who number between 225 and 250. C. N. Barnes, secretary, Grand Forks, suggests that the only way they have found to keep members interested and secure accessions to the rolls is by doing something all the time, thus showing the members that the officers are not asleep and that they are endeavoring to accomplish something for the association. New members are referred to as difficult to obtain without a great deal of correspondence, which must be systematically prosecuted.

WISCONSIN RETAIL HARDWARE ASSOCIATION.

During the year the Wisconsin Retail Hardware Association has gained about 20 in membership, making the total at this time 301. At the next annual meeting, which will be held February 3 and 4 at the Republican House, Milwaukee, efforts will be made to perfect the formation of the State Hardware insurance company for the benefit of the members. C. A. Peck, secretary, Berlin, remarks that loyalty to the association and its objects is indispensable to its success.

NEBRASKA RETAIL HARDWARE DEALERS' ASSOCIATION.

The increase in the membership of the Nebraska Association during the past year has been 15 per cent. H. J. Hall, secretary, Lincoln, observes a disposition on the part of the retail dealers of the State to take advantage of the opportunities offered through association work, and letters received from time to time show a desire to stimulate the good work by suggestions and new ideas for presentation to the members at the annual meeting.

IOWA RETAIL HARDWARE DEALERS' ASSOCIATION.

The next annual meeting of the Iowa Retail Hardware Dealers' Association will be held at Des Moines, February 10, 11 and 12, headquarters being at the Kirkwood Hotel. A report of the insurance association will be presented, and the proposed Parcels Post bill fully discussed. Catalogue house competition and needed State legislation will also be considered. There will also be about 15 papers read by live and successful merchants on topics connected with the sale of Hardware and allied lines, the number of which is constantly growing. H. S. Vincent, Fort Dodge, is secretary of this association.

COLORADO RETAIL HARDWARE DEALERS' ASSOCIATION.

F. C. Moys, Boulder, secretary-treasury of the Colorado Retail Hardware Dealers' Association, reports that considerably more than 50 per cent. of the Hardware dealers of the State are now enrolled in this young and sprightly organization, and the officers feel greatly encouraged with their year's work. The annual meeting will be held on February 15 at Denver.

INDIANA RETAIL HARDWARE DEALERS' ASSOCIATION.

The Indiana Retail Hardware Dealers' Association reports a steady growth during the past year, and the individual interest manifested by the members has been very encouraging. The question of mutual fire insurance will come up for final action at the next annual meeting, which will be held in Indianapolis, February 16, 17 and 18. M. L. Corey, Argos, who is secretary of this association, is also the energetic secretary of the National Retail Hardware Dealers' Association.

PENNSYLVANIA RETAIL HARDWARE DEALERS' ASSOCIATION.

The third annual convention of the Pennsylvania Retail Hardware Dealers' Association will be held in Williamsport on February 16 and 17. About 50 members have been added to the rolls since the last gathering, which makes a good showing for the year. The secretary of this comparatively young association is J. E. Digby, McKee's Rocks.

ILLINOIS RETAIL HARDWARE DEALERS' ASSOCIATION.

L. D. Nish, Elgin, secretary of the Illinois Retail Hardware Dealers' Association, advises us that the increase in the membership during the year has been 30 per cent. greater than the increase for 1902. The next convention will be held at East St. Louis, February 23 and 24.

OHIO HARDWARE ASSOCIATION.

The Ohio Association, the oldest of the State organizations, will hold its next convention in Cleveland, February 23, 24 and 25, the headquarters being at the Hotel Hollenden. The special feature of this gathering will be a discussion of the proposed Parcels Post bill. The officers expect an attendance exceeding any other meeting in the past. The membership, according to Corresponding Secretary D. R. Burr, Piqua, shows a steady increase for the past year, and a large accession is expected through the next meeting.

MINNESOTA RETAIL HARDWARE ASSOCIATIO

The next annual meeting of the Minnesota Retail Hardware Association will be held at Elks' Hall, St. Paul, on February 24, 25 and 26. The association headquarters will be at Windsor Hotel, Fifth and St. Peter streets. From the many inquiries made and general interest manifested, the meeting promises to be the largest and most successful in the history of this influential association. The Parcels Post bill will be the chief subject of discussion. The membership of this organization exceeds 500, and Secretary M. S. Mathews, Boston Block, Minneapolis, expresses the opinion that it may be 550 by the time the convention is held.

CALIFORNIA STATE RETAIL HARDWARE ASSOCIATION.

This association consists of a number of divisional associations, embracing the Pacific Retail Hardware Association, which was the first retail Hardware body on the coast; the San Francisco Retail Hardware Association, Southern California Retail Hardware and Implement Association, Central California Retail Hardware Dealers' Association, San Joaquin Valley Retail Hardware Association, Alameda County Retail Hardware Association and North Coast Retail Hardware and Implement Association. The State Association is really the outgrowth of several of these sectional organizations, but the others were established later and more or less at the suggestion of the State body. The association conducted on these lines has been very successful, and boasts of more than 350 members, who are enthusiastic over the benefits resulting from their coming together in this way. During the coming year it is the intention of the association to engage a salaried organizer, a man of ability, whose duty it will be to visit every Hardware dealer in the State not a member of the association, with a view to enlightening him as to the purposes of the association and pointing out the advantage of becoming affiliated with the organization and its work. The secretary of the California Association is Henry Gracey, 235 Powell street, San Francisco.

CONNECTICUT STATE ASSOCIATION OF RETAIL HARDWARE DEALERS.

This association was organized in March last, and embraces many of the best known and most enterprising houses in the Nutmeg State. The association idea is, of course, new to dealers in this section of the country, and many of them have not yet awakened to the benefits to be derived from organized effort. However, there is no reason why the success which has attended the formation of associations in the West should not be duplicated in Connecticut when its merchants become alive to the advantages of organization. The time and place of the next meeting have not yet been determined, but Charles L. Way, secretary, Hartford, is making an energetic canvass, and expects to enroll the great majority of the Hardware merchants of the State by the time the convention is held.

NEW YORK STATE ASSOCIATION OF RETAIL HARDWARE DEALERS.

The annual meeting of the New York State Association of Retail Hardware Dealers will be held at Rochester, March 8, 9 and 10. Vigorous efforts are being made to stir up the merchants of the State as to the necessity of organization to correct evils and abuses which beset the trade, and a large and enthusiastic convention is looked for. The membership of this association embraces many of the largest and most successful dealers in the State, and they recognize the desirability of bringing into the organization as many of their Hardware brethren as possible. The secretary of this association is John R. Taylor, Little Falls.

INDIAN TERRITORY RETAIL HARDWARE, IMPLEMENT AND VEHICLE DEALERS' ASSOCIATION.

The next meeting of this association will be held on the second Tuesday in May, in Oklahoma City. At this time it is hoped to induce the dealers in Oklahoma Territory to become affiliated with the association, and thus form a stronger and more effective organization. S. R. Frazee, Vinita, is the secretary of the Indian Territory Association.

MICHIGAN RETAIL HARDWARE DEALERS' ASSOCIATION.

During the year about 50 new members have been added to the rolls of the Michigan Association. The prestige of the association has also been materially increased, and the outlook for further growth and usefulness was never better, in the opinion of the secretary, A. J. Scott, Marine City. The annual meeting will be held in Grand Rapids in August next.

WASHINGTON HARDWARE ASSOCIATION.

The annual meeting of this association was held a few weeks since, November being the month selected for their yearly gathering. The work of this association is being pushed with vigor and earnestness. At the last meeting it was determined to divide the State into seven sections, forming divisional associations, with headquarters at the following points: Whatcom, Seattle, Olympia, Spokane, Walla Walla, North Yakima and Wenatchee. It is designed to have a vice-president and secretary for each section, who will work under the direction and in conjunction with the State officers. In this way questions of importance can be discussed at frequent meetings during the year, thus materially facilitating the growth and usefulness of the State organization. A. C. Blake, of Munro, Blake & Haskell, Whatcom, is secretary of the Washington Association.

MATTHAN HARBSTER.

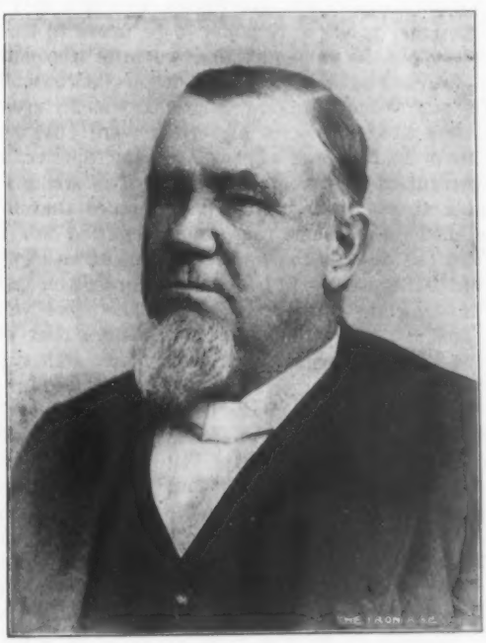
MATTHAN HARBSTER, the subject of this sketch, who recently retired from the presidency of the Reading Hardware Company, is widely known as one of the pioneer Hardware manufacturers in Pennsylvania, where his long experience in commercial ventures and successful manufacturing enterprises has given him great prestige among his fellow citizens as a man of sterling business sense and keen financial foresight. Through his connection with many of the largest manufacturing industries in the city of Reading, he has contributed greatly to the growth and development of the community, where he delights to make his home. After having been identified with the Reading Hardware Company for fully 50 years, honored, respected and esteemed alike by his employees and business associates, Mr. Harbster's advancing years have caused him to relinquish his position as president of the company that his untiring energy and perservance have built up, and to place the responsibility of its future growth and welfare into younger hands, to be guided by modern business methods. John E. Harbster, who succeeds his father, brings to the position all the qualifications that result from an intimate knowledge of every branch of the business, acquired through many years of close application and association with his father in conducting affairs at the factories in Reading.

Matthan Harbster is of German ancestry. He was born in Lehigh County, Pa., May 18, 1831, and when a lad moved with his parents to Montgomery County. During the winter months he attended the public schools at Pottstown, working on the farm in summer. Young Matthan set to work early to support himself, and at an age when many boys are still studying in school he was engaged in boating on the Schuylkill and Juniata canals. This work continued for a number of years, when he finally entered the shop of his older brother, William, at Hamburg, for the purpose of learning the blacksmith's trade and that of coach making. He followed these occupations for several years as a journeyman, perfecting himself in his chosen trade and adding to his stock of valuable experience. In 1852 Matthan and his brother John became associated in business with William, their eldest brother, who had during the previous year laid the foundation of the present Reading Hardware Company in a little blacksmith shop which stood on a portion of

the site now occupied by the company's immense plant. Under the firm name of Harbster Bros. this new industry in Reading grew apace, and such was the demand for their goods that more extensive works and a larger working capital became imperatively necessary.

In 1858 the business was reorganized, William M. Griscom becoming a member of the concern, and the name of the firm was changed to Harbster Bros. & Co., thus continuing until 1862, when the present title was adopted.

It is unlikely that an able, broad minded, self made man like Matthan Harbster should not be connected with various enterprises in the community where he resides. His name appears on the list of directors of many solid financial and industrial institutions. Besides being president of the Reading Screw Company, whose works are located at Norristown, Pa., he is president of the Montello Brick Works, one of the largest brick industries in the world, having a capital of $3,000,000, and he holds a similar position on the Board of Directors of the Reading Land & Improvement Company. He is a director in the following commercial organizations: Reading City Passenger Railway, Farmers' National Bank of Reading, Reading & Columbia Railroad, and is Water Commissioner of the Reading Water Supply, as well as a director of the Young Men's Christian Association. Mr. Harbster is acknowledged to be one of the best business men in Reading. He is a Republican in politics, a member of the Masonic fraternity, and is deeply interested in civic affairs, having represented his ward for several years in the Common and Select Council and on the School Board, where his efficient services in behalf of improved educational facilities were highly appreciated by his fellow citizens.



MATTHAN HARBSTER.

Matthan Harbster, on the occasion of his formal retirement from the presidency of the Reading Hardware Company, gave a banquet to the salesmen and department managers able to be present, at the quaint Mineral Springs Inn, Thursday, December 17, the party numbering 28. The numerous speakers paid tribute to Mr. Harbster as a genial, whole souled, capable man, whom they all delighted to honor; that the history of the Reading Hardware Company was the history of Matthan Harbster, who, after a long career of earnest, arduous, conscientious business life, can retire from the active management of the company, resting assured that they will continue their past successes.

C. A. Bauerlen Hardware Company, Winona, Minn., have been incorporated with a capital stock of $50,000, of which $25,000 has been paid in. C. A. Bauerlen is president; Bertha Bauerlen, vice-president, and Geo. P. Meyer, secretary and treasurer.

CHICAGO RETAIL HARDWARE ASSOCIATION.

THE CHICAGO RETAIL HARDWARE ASSOCIATION at its meeting held December 30 elected officers for the year 1904 as follows: President, H. E. Gnadt, succeeding D. McLaughlin; vice-president, G. A. Neeb, succeeding H. E. Gnadt, and re-elected the following: G. R. Lott, secretary; John Hora, collector, and J. L. Smith, treasurer. The new Executive Committee consists of H. E. Gnadt, G. A. Neeb, W. B. Costello, D. McLaughlin and W. T. Gormley, and the Grievance Committee of Grant Porter, J. H. Bixler, H. E. Rebmann, Hans Fehr and Chas. Dalstrom. It was reported that during the year the membership of the association had increased from 144 to 157 members. A committee, consisting of W. H. Bennett, Z. T. Miller and O. B. Stebbins, presented resolutions in regard to the Iroquois Theater disaster, which were adopted. Resolutions were also passed expressing the regret of the association at the death of Gustav Guthaus, a member.

CHICAGO HARDWAREMEN TO BUY SPRING GOODS JANUARY 15.

THE Chicago Retail Hardware Association will hold a special meeting January 15, in Hall 512, Masonic Temple, for the purpose of buying spring goods, such as Refrigerators, Garden Hose, Oil Stoves, Ovens, Gas Tubing, Spring Hinges, Gas Hot Plates, Wire Cloth, Lawn Mowers, Brass, Gas Hose, Cocks, &c. Manufacturers and jobbers are invited to present bids at that meeting, with the assurance that they will be treated in confidence.

SHERMAN, BROWN, CLEMENTS COMPANY.

SHERMAN, BROWN, CLEMENTS COMPANY is the title of a new concern, dating from January 1, 1904, organized to conduct a Heavy Hardware, Railway, Machinists' Tool and Supply business at 52 Dey street, New York. They are direct representatives of several prominent producers of Iron and Steel, Nuts, Bolts, Packings and similar goods, and propose to take on other kindred noncompetitive lines as the business develops, carrying no stock at present but doing so eventually. R. B. Sherman, the senior, was for about 20 years prominently connected with Manning, Maxwell & Moore, and for the two years last past has been with J. Edward Ogden, New York. C. W. Brown and E. H. Clements have been respectively two and four years with the latter house, but have had ripe experience in years in Heavy Hardware lines. Mr. Brown will give a large portion of his time to marketing the goods, Mr. Clements confining himself largely to the management and supervision of the office.

AMONG THE HARDWARE TRADE.

Bersche & Bockholst have succeeded Koenig & Bersche in the Hardware, Stove, Farming Implement, Paint and Sporting Goods business in Plymouth, Neb.

E. L. Wellington has bought the F. D. Cleveland stock of Hardware in Hornick, Iowa, and will continue at the old stand.

C. Vunk & A. West are successors to W. W. Adams in the Hardware and plumbing business in Dryden, N. Y.

E. J. Martin has disposed of his Hardware, Stove and furniture business in Harper, Kan., to F. H. Dresser.

Jno. W. Jones has bought Mr. Holmes' interest in the Hardware firm of Rankin & Holmes, Chanute, Kan., and the style is now Rankin & Jones.

Barbee-Watkins & Co., Graham, Va., have disposed of their business to Fowler-Richardson Hardware Company.

Mosteller & Clark have succeeded Mosteller & Staley in the Hardware, Stove, Tinware and Sporting Goods business in Pittsburgh, Kan.

CHICAGO HARDWARE MARKET IN 1903.

THE year just closed was one of great prosperity to the manufacturer of and dealer in Hardware of every class. The first half of the year shared in the general feverish condition incident to an unprecedented demand and inadequacy of supply. The third quarter of the year, while one of decreasing activity in the general iron and steel business, continued to be active in Hardware, and the falling off in the last six weeks in the year was so slight as to confirm the confidence that has been felt in this branch of business throughout the year. Hardwaremen study crop reports with greater zeal than they study Wall Street operations. Vast agricultural interests, from the farmer himself to the manufacturer of Implements and Vehicles, are not at all in sympathy with stock jobbing affairs in the financial centers. When the country is blessed with good crops and farmers receive good prices for these crops general Hardware business is bound to be good and is influenced but slightly by all other considerations. Special lines are subject to special influences, as for instance the influence of the prices of labor and brick and lumber on Builders' Hardware, but the great tonnage of Hardware supplies sold goes to the thousands of local dealers in small towns and cities where the bulk of the money that is spent comes from the products of the soil.

JANUARY opened up with an advance in prices of from 5 to 10 per cent. in very many lines of Hardware. This advance instead of checking seemed only to stimulate the demand, and manufacturers and jobbers alike were unable to keep pace with their orders. Nuts and Bolts were advanced strongly in price and mills were far behind their orders. The Cut Nail Association on January 15 raised its price to $2.36½, Chicago. Independent manufacturers of Wire Nails reported that their full manufacturing capacities were sold for three months in advance. Throughout January and February mills operated their plants most of the time night and day, and very many increased their capacity 20 to 100 per cent. There is no telling what volume of sales would have been made had the manufacturers been able to receive the raw material and to find cars enough to ship the finished product.

IN FEBRUARY Cut Nails were again advanced $1 per ton, which had the desired result of relieving the stress of the current demand. Manufacturers of Implements and Cars, as well as railroad companies, all specified heavily on contracts and kept the wires busy urging prompt shipment. In February Butts and Hinges were lowered in price by the hot competition existing between Eastern and Western makers, and jobbers and retailers bought heavily for future shipment, with the expectation that prices would advance. The demand for Barbed Wire was greater than it had been any January and February previous. Large contracts were entered into for shipment throughout the year, and heavy specifying was done on old contracts. February 20 the Steel Wire and Nail producers advanced their prices $2 per ton, making Barbed Wire $2.80 and Wire Nails $2.20. During these months the demand for Shelf and Heavy Hardware and for Builders' Hardware far exceeded the supply, and the manufacturers of spring lines, notably Garden Tools and Shovels, almost abandoned the hope of being able to supply the demand.

IN MARCH the manufacturers of Nails, Wire products, Shovels, Tools, Hinges and other lines were breaking all records in the production of these lines, but, notwithstanding that fact, they were not able to keep pace with the demand. Railroads were crippled by lack of adequate coal supply for their locomotives and by the shortage of locomotives and cars, and the most serious problem confronting both buyer and seller was that of transportation. In March the advance of Ingot Copper amounted to 2 cents per pound and led manufacturers of Copper Sheets to advance their prices correspondingly. Tinware also was advanced 7½ per cent., and Lead and Zinc also were strengthened in price. The new business in Wire Nails in the month of March was something abnormal, and the advance in price seemed to add fuel to the flame rather than dampening it. Cut Nails were selling actively, as buyers anticipated another advance in April. The makers of Barbed Wire were six months behind with their orders. Manufacturers of Garden Tools, Shovels and Spades were crippled by the inadequacy of their supply of Handles.

Disastrous floods in the Southwest interfered considerably with the demand in that section. Already the demand for Wire Cloth and Screen Doors proved to be the greatest in the history of that trade. Poultry Netting was active. Hatchets, Chisels, Carpenters' Tools and Builders' Hardware were moving with unusual vigor, and the fact developed that the manufacturers of Refrigerators, Lawn Mowers and Ice Cream Freezers and other warm weather goods were going to be taxed to their utmost to supply the demand. Heavy Hardware, including Sheets, Bars, Plates, Nuts, Bolts, Rivets, Screws, Blacksmiths' and Wagon Makers' Supplies, was in great demand, and Machine Bolts and Nuts were advanced in price 10 to 15 per cent. Sheet Zinc and Spelter, Black and Galvanized Sheets all advanced. The strike in the plumbing supply trade, which had crippled that branch of the business for some time, was submitted to arbitration, and business picked up in the hope of an early settlement. Mills were still behind their orders on Cut and Wire Nails, Plain and Barbed Wire. The Steel Nail and Wire business for March was better than that of the previous year, and would have been better still had not the leading Wire mills been forced to close down for want of Rods, as the Rod mill of the United States Steel Corporation, at South Chicago, was compelled to transfer its operations to Billets to keep the Milwaukee mill running. Mills producing Wire Fencing had gradually increased their capacity, but still were unable to cope with the demand. Tin Plate, Roofing Supplies, Washers, Copper Sheets and Wire Cloth all advanced in March, the latter from $1.10 to $1.15, because of the scarcity in the supply. Cut Nails advanced $1 per ton. Already large orders were beginning to be taken for delivery in July and August on autumn goods, such as Stove Pipe, Stove Boards, Axes, &c.

APRIL witnessed a sufficient let up in the urgency of the demand to permit many of the mills to catch up in a measure with their orders, though Rivets, Washers and other lines were still inadequate to supply the demand. Bright Wire goods were advanced 10 per cent.; Cut Nails were firm at the advance made the month previous. Jobbers, as a matter of fact, were more concerned in getting the goods to fill orders than in the taking of new orders. While March was a record breaking month, April bid fair to surpass it in every line. Carpenters' Tools were more active in April than at any time in the history of the trade. Poultry Netting and Wire Cloth shared in the general scramble to fill orders. Strap and T Hinges were still low, in consequence of a fierce competition, and an extremely large tonnage was placed. The wet weather of the middle of April caused a slight let up in the demand and gave the mills some opportunity of catching up. Handles for Axes and Garden Tools made another advance, and Corrugated Sheets were boosted 10 cents per 100 pounds. Nuts and Bolts were hard to get, and premiums were paid for quick deliveries. When the books for April were closed it developed that the business was a little less than March, instead of greater, as was earlier promised. The demand fell off for Nails and Wire products to some extent.

MAY.—About May 1 many leading manufacturers of Builders' Hardware promulgated a new system by which the bidding for an entire building in a lump sum was to be done away with, quotations to be made thereafter by items. Late in April the Builders' Hardware for the Merchants' Exchange Building at San Francisco was placed in Chicago at a cost of about $4000. In May

contracts were placed at Chicago for the Hardware of the Oliver Building, Pittsburgh, aggregating $8000, and the Railway Exchange Building, Chicago, $14,000, together with a large number of smaller structures. The list on Plated Butt Hinges was revised, averaging a slight advance in prices. Rivets, particularly those for structural purposes, were greater in demand than the supply could take care of. Wire Cloth advanced from $1.15 to $1.20 and ultimately to $1.25, with sales for quick delivery made at $1.30. It developed that the demand for Black Cloth was greater than the manufacturers had anticipated, and a slight falling off was shown in the Green. Barbed Wire was easier in demand and Smooth Wire active, with a great scarcity of Nos. 14 and 16. In May the business in Builders' Hardware began to suffer from the tie up of building operations all over the country by the striking union men. This lessening in demand extended to many other lines, but mills were still so far behind their orders that goods were almost as difficult to get as ever. Tin Plate was particularly scarce and a premium of $2 per box was easily obtainable for spot shipment. No relief was found in the congested Refrigerator and Lawn Mower business. Toward the end of the month the fact developed that the flood in the Southwest had been much more serious than had been supposed, and the large Hardwaremen in St. Louis were affected so unfavorably that Chicago men got the benefit of many orders they could not fill because of the difficulty of shipping from flooded St. Louis warehouses.

JUNE.—About June 1 the large Implement men came into the market with contracts for their season's supply of Nuts, Bolts, Rivets, Washers, &c. It also developed about this time that the cold spring had reduced greatly the sale of strictly summer goods and that local dealers, who had purchased heavily, were likely to carry over large quantities. Sheet Zinc was still scarce and 8 cents per pound was about the lowest price at which it could be obtained. A large business was done in the month of June in all lines, but it was necessary to make marked concessions in Heavy Hardware to keep that line of goods up to the mark. Washers, Tin Plate, Snaths, Scythes were almost impossible to secure in sufficient quantities to meet the demand. The record breaking hay crop surprised both manufacturers and dealers with stocks inadequate to meet the demand. Fall goods were still ordered, though in somewhat more sparing quantities. Trade in Shafting, Pulleys, Hangers, Fencing, Wire, Bars, Bolts, Rivets, Spikes, Plates and Sheets was active. Nails were dull; Chain practically dead, and Washers and Tapped Nuts were in greater demand than the supply.

JULY.—The opening of July marked a decided falling off in the demand for Nails and Wire Products, with the exception of Wire Screens, which continued active. Bolts, Nuts, Washers, Spikes, Sheets and Tin Plate had resumed normal conditions. Shelf Hardware was active in the country and slow in the city. At the end of June Hardware for the Iroquois Theater was placed with a Chicago dealer. Hay Forks, Snaths, Scythes and other Haying Tools and Appliances were extremely active, except in the flood stricken districts of the Southwest. Shafting, Pulleys and Power Transmission Devices were active early in July, and the demand for fall delivery of seasonable merchandise increased. Glowing crop reports helped business in every line, though the rapid decrease in the cost of Billets and other raw materials led many buyers to hold off for a possible reduction in prices. Toward the end of the month jobbers seemed to have adopted the policy of reducing their stocks, selling actively and buying sparingly. Builders' Hardware was extremely slow in Chicago and Omaha, due to labor troubles, but fairly active elsewhere. On July 22 the new list of Wood Screws was adopted by the Screw Association. The continued wet weather throughout the spring and early summer led to a very slow demand in Wind Mills, Pumps and kindred goods, and manufacturers of these lines reached out for export trade, meeting with a fair measure of success.

AUGUST.—The unhappy financial developments in the East and the rapid depression of securities led to a feeling of some uncertainty in August, which induced jobbers and large buyers to hold off on their purchases. This condition was aggravated by the continued wet weather and the devastations of floods, and particularly by the hostile attitude of labor. The only district in the country where great activity in Hardware lines was shown was in the Southwest, where active operations had been prevented for two months past by the devastation of the floods. The consumption of Binder Twine proved to be far less than was expected, and prices fell. Tin Plate continued active and scarce, orders dating as far back as March remaining unfilled up to this time. Stove Boards, Stove Sheets, Stove Pipe and Supplies were exceptionally strong, but in most other lines buying was confined to small lots for immediate consumption. Toward the middle of August the old bugaboo of car shortage began to assert itself. Bars, Shapes and Shafting were strong, Black Sheets weak, Galvanized very active, Builders' and Shelf Hardware extremely quiet, and only a fair demand was felt for fall goods, though Ammunition was in ready demand. About this time the prospect of a bumper corn crop began to make itself felt in the active demand for Corn Huskers and for 8 and 10 Penny Cut and Wire Nails for building corn cribs. Cotton Window Cord was advanced 10 per cent., in line with the increased cost of cotton, and many Axe manufacturers added 20 per cent. to their selling price.

SEPTEMBER saw a renewal in the activity of Wire Nails, particularly in 8 and 10 Penny Nails for corn crib construction, and orders were usually accompanied with instruction to ship immediately from stock at mill. Prices in Heavy Hardware weakened, in sympathy with iron and steel. Shafting and Hangers continued active; Washers, Bolts and Sheets slow; Stove Bolts and Rivets active, and Carriage Hardware, Carriage Bolts, Tires, &c., very inactive, because the wet weather had held together thousands of vehicles that otherwise would have rattled to pieces. In general, the business in the city of Chicago was slow, owing to the untenable demands of labor, but throughout the West and Northwest business was sufficiently active to make up for the loss. September, in general, was an excellent month, with the greatest demand in the history of the trade in Corn Tools, Small Tools and Carpenters' Tools, and a reassuring increase in the demand for Builders' Hardware. In this month the independent Shovel manufacturers advanced their prices within 25 cents of the association prices. Steel Wheelbarrows, Picks and Contractors' Supplies, Blacksmiths' Supplies and Shelf Hardware showed exceptional activity, with Heavy Hardware, Bolts and Nuts exceptionally weak. Lawn Mower agents, who had been accustomed to working late into the fall of each year, returned to their principals about the middle of August with their full season's output entered on their books. The celebration of the centennial of Chicago's founding brought thousands of buyers to this market, and no doubt quickened the business of that month beyond its normal proportions. An unfavorable sign was noted in the slowness of collections and the disposition of country banks to draw the lines taut in dealing with local merchants.

OCTOBER compared badly with the previous month, as buying for spring trade was retarded by the general hope for a decrease in prices. This was offset to some extent by the buying of railroads and large Agricultural Implement manufacturers. Castings of all kinds were reduced on the average 15 to 18 per cent., because of the very low prices prevailing on pig iron. Builders' Hardware was abnormally quiet, Nuts and Lag Screws weak. Wire Nails slow, but Shelf Hardware and winter goods quite active.

NOVEMBER.—With the opening of November came the announcement of a reduction in prices of Cut Nails, amounting to 25 cents per 100 pounds at Pittsburgh and 23½ cents at Chicago, the new rate compelling the Chicago buyer to pay the full freight of 16½ cents per 100 pounds, instead of 15 cents, the arbitrary differential that existed before. The new price was $2.11½, Chicago, as against $2.35, which had been the price for the second and third quarters of the year. The Shovel Association disbanded about November 1, after seven years of activity in the trade, and prices emerged from the gen-

eral mix up which followed somewhat lower in the better grades and slightly higher in the cheaper grades. Sledges were advanced about 15 per cent.

DECEMBER.—Late in November the price of Wire Nails was reduced to $1.90, Pittsburgh, by a large independent producer, as against $2, Pittsburgh, named by the American Steel & Wire Company. This price continued to be quoted for some weeks, and about the middle of December the American Steel & Wire Company made the price $1.85, Pittsburgh. The Chicago price in either case was 15 cents higher than the Pittsburgh price named. This reduction in price stimulated buying, and many large contracts were closed at the new prices. Holiday goods sold exceptionally well, and a majority of the producers and jobbers report that the holiday trade for this season surpasses all previous records. It may interest Hardwaremen to know that one mail order house in Chicago has sold Stoves to the amount of $2,000,000 in the season just closed, and that they are operating the largest Stove foundry in the United States to the full of its capacity in order to keep pace with the trade. There is food for thought in this.

As we said at the beginning, the Hardware business for the year 1903 has been exceptionally good, and the decrease in demand the last few weeks in the year was welcomed by the majority of producers as giving them an opportunity to catch up and to make needed repairs in their plants. It is unquestionably true that the whole year's business will surpass that of any previous year by a comfortable margin.

The destruction of the plant of the Chicago Steel Mfg. Company on December 30 may have a tendency to strengthen the sagging prices on Wire Nails, just as the burning of a large manufactory of Wire Cloth at New Freedom, Pa., in November stopped the demand for a reduction of that product.

THE OUTLOOK.—Looking to the future, there is no reason to take a pessimistic view, as the heavy iron and steel products, whose depression tended to affect the general business of the country, have gained new life and are entering the new year with bright prospects before them. Crops have been good and farmers are receiving high prices for them; so much so that the opulent West is now lending money to the impoverished East. Building will doubtless be resumed in the coming spring on the basis of a lower range of cost of labor and materials, which will present some inducement to the capitalist to invest his money in that way. The day is past when a clique of union leaders can cripple the industries of the country, as manufacturers, contractors and employers generally have been forced to form themselves into associations that are amply able to prevent recurrence of past abuses. The growing magnitude of our export business will serve not only as a means for enriching our own country, but will act as a safety valve, preventing prices from being forced lower than their normal plane. This export business promises to assume liberal proportions, particularly to Cuba and our island possessions.

Chicago Wire Nail Prices.

The course of prices of single carload lots at Chicago during 1903 and for several years preceding is shown in the following table, the monthly prices being averaged from weekly quotations in our market reports:

Months.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.
January	$2.08	$2.16	$2.35	$3.53	$1.59	$1.55	$1.50	$2.42
February	2.12½	2.20	2.45	3.53	1.73	1.57	1.45	2.42
March	2.20	2.20	2.45	3.53	2.09	1.55	1.50	2.57
April	2.15	2.20	2.45	3.28	2.25	1.47	1.45	2.55
May	2.15	2.20	2.45	2.53	2.35	1.45	1.42½	2.70
June	2.15	2.20	2.45	2.48	2.60	1.43	1.42½	2.70
July	2.15	2.20	2.45	2.43	2.70	1.36	1.35	2.70
August	2.15	2.20	2.45	2.43	2.80	1.36	1.37½	2.70
September	2.15	2.15	2.45	2.35	3.10	1.45	1.50	2.70
October	2.15	2.05	2.42½	2.35	3.20	1.47½	1.52½	2.70
November	2.15	2.00	2.35	2.35	3.28	1.40	1.50	2.70
December	2.00	2.00	2.25	2.35	3.53	1.37½	1.50	1.60
Average for year	$2.13	$2.14½	$2.41	$2.76	$2.60	$1.45	$1.46	$2.54

Chicago Barb Wire Prices.

The course of prices of Galvanized Barb Wire, in single carload lots, Chicago delivery or equal, has been as follows in 1903 and several years preceding, our weekly quotations being averaged:

Months.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.
January	$2.68	$3.01	$2.95	$4.13	$2.05	$1.90	$1.90	$2.02½
February	2.75	3.10	3.05	4.13	2.25	1.90	1.85	1.97½
March	2.80	3.10	3.05	4.13	2.62½	1.90	1.90	1.95
April	2.77	3.10	3.05	3.88	2.80	1.87½	1.80	2.05
May	2.75	3.10	3.05	3.13	2.95	1.80	1.80	2.15
June	2.75	3.10	3.05	3.13	3.20	1.80	1.75	2.00
July	2.75	3.06	3.05	3.10	3.30	1.80	1.75	2.00
August	2.75	3.00	3.05	3.10	3.40	1.80	1.65	1.90
September	2.75	3.00	3.05	3.00	3.67½	1.80	1.80	1.85
October	2.75	2.68	3.05	3.00	3.77½	1.82½	1.80	1.85
November	2.75	2.60	3.05	3.00	3.88	1.82½	1.80	1.85
December	2.60	2.60	3.00	3.00	4.13	1.82½	1.80	1.95
Average for year	$2.74	$2.93	$3.04	$3.39	$3.17	$1.85	$1.80	$1.96

Chicago Cut Nail Prices. 1903.

The following are the Chicago prices for Cut Nails in small lots during the year:

January	$2.24½	July	$2.35
February	2.31½	August	2.35
March	2.31½	September	2.35
April	2.35	October	2.35
May	2.35	November	2.11½
June	2.35	December	2.11½

Average for 1903, $2.33; 1902, $2.25; 1901, $2.34; 1900, $2.48.

TAYLOR BROS. COMPANY'S FINE RECORDING INSTRUMENTS.

TAYLOR BROS. COMPANY, Rochester, N. Y., and 85 Chambers street, New York, are the American agents of the firm of Short & Mason, Limited, Hatton Garden, London. Taylor Bros. Company are also large manufacturers of all kinds of Thermometers, &c., for residential and mechanical purposes, to which the comprehensive lines of Short & Mason are an important addition. Some of the leading scientific instruments of precision made by the latter are Aneroid Barometers, Barographs, Compasses, Clinometers, Clinometer Rules, Anemometers, Air Meters and Sunshine Recorders. They manufacture a large line of Aneroid Barometers in watch form, for carrying on the person, in three qualities, and varying prices, 1½ and 1¾ inches in diameter, pocket sizes, 2½ inches diameter, Traveling Sets, Sphere Aneroids, Military, Engineering and Surveying Aneroids, Weather Aneroids, and others, in a variety of patterns, for ships, yachts, &c. Those of pocket size are frequently carried by travelers and tourists and are so sensitive that they indicate even slight gradients in a railway car, as well as hights of hills and mountains. Special forms are made for making approximate surveys and levelings for roads, railways, canals, water courses and mines, the readings being easily and quickly taken. Barographs show at a glance the exact hight and reading of the Barometer, as well as recording the same by a pen on a printed chart, which is placed around the cylindrical case of a clock, rotating a complete circle in a week; thus the exact reading can be seen for any time during the week or retained as a record and replaced with fresh weekly charts. A particularly interesting and useful Compass is their Night Owl Marching and Surveying Compass, this instrument having a mechanical arrangement by which a magnetic course or direction can be set accurate to a single degree without the aid of light in any way. Clinometers are used for measuring angles of elevation and depression, Clinometer Rules for ascertaining the hight of any object at a known distance from point of observation, Anemometers for determining the velocity of the wind, Air Meters for the measuring of air currents through mines, tunnels, sewers, &c., Sunshine Recorders for recording the number of hours of sunshine in each 24 hours, and many other articles of precision of kindred character.

WILLIAM H. COLE of the firm of Tower & Lyon, 95 Chambers street, New York, left New York New Year's Eve for what has come to be an annual trip to the important commercial cities of the Pacific Slope, from Los Angeles, in Southern California, to Vancouver, British Columbia, and some of the large interior cities along the lines of the Northern transcontinental lines. He expects to be back in New York in a month or six weeks.

The Factory and Office System of the Atlas Manufacturing Company.

PART I.

THE ATLAS MFG. COMPANY, New Haven, Conn., well known as the manufacturers of the Bradley Steel Shelf Brackets and of Wire Coat and Hat Hooks, conduct their factory and office according to a most carefully planned system. H. L. Bradley, the manager, has prepared a scheme for work, which is much like a constitution and by-laws, giving the rules to be followed by every person in both the office and factory.

When Mr. Bradley was asked about this collection of the rules, regulations and system used in the proper conduct of the company's business, he said that he had started it because as the business grew it had become necessary to make a record of the rules that were made from time to time, so that he and those associated with him could see when ever desired how questions had once been decided, and also so he could behold his subordinates up to the rules and usages of the house. This reference book, he claimed, was frequently consulted and prevented occasional differences of opinion, and also the necessity of going over points that had been previously considered and settled.

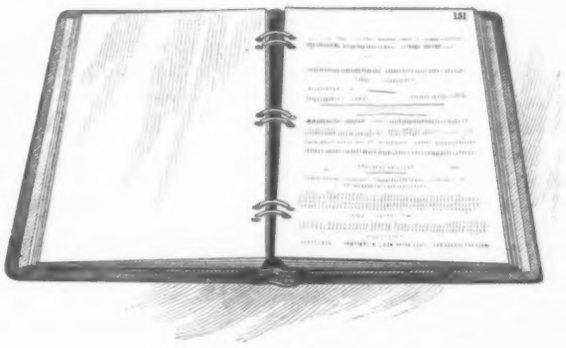


Fig. 1.—The Scheme Book.

This unique collection of rules is kept in the office in a Removable Leaf Scrap Book measuring 10 x 15 inches, and is reproduced in Fig. 1. The pages are typewritten, and are inserted as needed, a book of this description making it a simple matter to make additions and changes as desired. The contents of the book are reproduced in full with the addition of such illustrations, explanatory footnotes and cross references as will help to make the system clear and instructive to manufacturers and other business men. The system as here explained has been successfully used in their comparatively small factory. Some changes would probably be necessary in a larger establishment, but the system, as a whole, might easily be modified and expanded to suit other conditions.

Scheme for the Conduct of Work.

ATLAS MFG. COMPANY.

The work of the Atlas Mfg. Company is carried on under the following general heads:

Operating.
Office.

The "Operating" Division comprises an outline of the methods to be followed in operating the plant, and is subdivided into the following departments:

	Page.
Building and Grounds	10[1]
Power and Heat	20
Machine Room	30
Tool and Supply Room	40
Manufacturing Department	50
Stock Department, including	60
Packing Room (putting in retail packages)	61
Shipping Room (packing for shipment)	62
Receiving Room	63
Stock Room (containing finished goods)	64
Store Room (containing material and finished parts)	65

[1] Ten pages are assigned to the matter of each department in the book, but these page numbers do not refer to actual page numbers. They might be better called the department numbers. For example, the page number for the Stock Department is 60. This department is divided into sub-departments, such as the Packing Room, the Shipping Room, &c., both of which are given a separate number in the units place, while retaining the same number in the tens place, as will be observed by referring to the index, in which the number of the Packing Room is 61, the Shipping Room 62, &c. Further divisions are made into sections and paragraphs as is required for convenience and for ready reference. To carry out the comparison of this scheme with a constitution and by-laws, as was suggested in the introduction, the numbers of the departments and sub-departments may be considered as numbers of the articles in the constitution, and the section numbers as the numbers of the sections.

The "Office" Division is subdivided into the following departments:

	Page.
General Correspondence	70
Selling	80
Collecting	90
Purchasing	100
Billing	110
Office Routine	120
Regular Bookkeeping	130
Cost Accounting	140
Inventory	150
Records	160
Contracts and Agreements	170
Statements and Reports	180

BUILDING AND GROUNDS.—Page 10.

Sec. 1. The main entrance to the building is to be opened when the engineer comes in in the morning; the hat and cloak rooms 10 minutes before the starting time in the morning and all the noon hour.

The lower hall door leading from the hat room to the factory is to be opened 5 minutes of 7 o'clock and 5 minutes of 1 o'clock, and closed promptly at 7 and 1 o'clock. It is to be opened at 2 minutes of 12 and 2 minutes of 5 o'clock. It is to be kept locked at all other times.

Sec. 2. The building and premises are to be kept locked at all times, except the regular office entrance and others that may be specified from time to time, or ordered open from the office for special purposes.

No one is to be admitted to the premises without permission from the office.

Sec. 3. All floors and stairways are to be kept swept clean and windows washed. The sidewalks are to be swept when necessary and cleaned promptly after each snow storm. The yard is to be kept free from litter.

Such sweepings, except paper, as can be conveniently burned are to be given to the engineer, and the rest of it is to be put on the ash heap.

All waste paper is to be delivered to the store room, there to be baled and sold with other forms of waste which accumulate in the factory. (See page 65, Sec. 9.)

SEC. 4. When not in use the elevator is to stand at the second floor.

SEC. 5. Gas and water are to be shut off at the meters each night if there is occasion for so doing.

SEC. 6. All leaks in roof and pipes and other needed repairs are to be reported promptly to the office by those in charge of the departments where the repair is needed.

SEC. 7. *Benzine* and *Kerosene.*—Only the amount of benzine, kerosene and kindred substances allowed by the insurance (10 gallons) is to remain in the main building over night.

The rules for the several departments follow:[2]

RULES FOR THE JAPAN ROOM.—PAGE 10B.

SEC. 1. The room is to be swept and sprinkled daily and kept clean at all times.

SEC. 2. The ovens are to be cleaned at least twice a month.

SEC. 3. The dripping pans dreening into the japan tub are to be kept clean.

SEC. 4. Rods are to be scraped or burned as often as necessary to prevent making a mark on the work.

Fig. 2.—Rack Holding Job Order Cards in Machine Room.

SEC. 5. No match is to be lighted in the room and no lantern or other light carried into it.

SEC. 6. No rags or oily waste cans are to remain in the room over night. They are to be placed outside of the door.

POWER AND HEAT.—Page 20.

(The rules for this division have not as yet been tabulated.)

MACHINE ROOM.[3]—Page 30.

SEC. 1. All work in the machine shop is kept track of on the "Job" plan, excepting "Shop Expense" (see Sec. 3) and the expense of operating the several machines in the manufacturing department (see Sec. 4), and when so desired these expense accounts can be carried as a separate job.

SEC. 2. A suitable rack[4] will be placed in the machine shop, having a sufficient number of cards[5] to accomodate all the different jobs being done at any one time in the shop. The number or letter of each job a man may be working on is to be placed on his ticket,[6] and all time spent on that job entered up against that number. In addition to these special number jobs (see Sec. 5) there will be the

Job No. D Office Charge New Tools
Began 4/17 Finished
Work to be done.
New Set of dies.

Fig. 3.—Machine Room Job Order Card.

NAME Tom Smith

JOB	WEEK ENDING 2/9					
	4	5	6	7	8	9
SHOP EXPENSE.	4	4	3			
NO 10 HOOKS.						
NO. 15 HOOKS.	1					
METER BRACKETS.		4				
NO. 10 BRAX FRAMES			3			
NO. 10 BRAX COMPLETE.						
SCREW BRACKETS.				7	4	
WIRE EYES						
CORRUGATED WIRES.					1	
SPOONS.						
D	4	1	3	2		
G.						9
			$15.42			
	9	9	9	9	5	9

Fig. 4.—Machine Room Time Slip.

[2] As yet only the rules for the japan room have been tabulated, but others will be added from time to time, as necessity requires.

[3] The machine room is the department in which the tools, machines and dies are made and repaired. The company make all their own machines, and although the first cost is a trifle greater, the results are found to be far more satisfactory, and the cost of repairs is less than on machines made outside.

[4] Fig. 2 illustrates this rack. It is made of a shellaced board with a hole in the top, by which it is hung on the wall. On the board are fastened 40 holders for the order cards, shown in Fig. 3. Opposite 26 of these holders are painted black letters, so that each order card may be placed in its correct place. The unlettered holders are for the cards naming the regular jobs, described further down in Sec. 2.

[5] One of the small order cards is shown in Fig. 3, and measures 1½ x 4⅝ inches. It is required that the foreman of the machine room make out one card for each job being done there. This he places in the rack shown in Fig. 2, for easy reference. A duplicate is then made out and sent to the office, where it is kept until the job is completed, showing the office what work is under way in the machine room. The cards are lettered A, B, C, D, &c. These letters are used in charging the time, as shown in Fig. 4, and of the material used.

[6] The time ticket used by the men employed in the machine room is shown in Fig. 4. This ticket, it will be observed, is intended to last for one week. On the left is a list of the regular jobs, and below it is a space for special jobs. Each man records the time spent each day opposite the proper job. At the end of the week the ticket is turned into the office, where all the regular jobs are charged against operating expense on the regular ledger, and are also entered on the inventory ledger. The special jobs, such as D and G, are charged against new tools, or the appropriate account. The number of hours worked is totaled and the amount earned is calculated and put on the card. When the pay roll is made up the front of the card is stamped with the paid stamp, illustrated in Fig. 5.

regular "Operating Jobs"—one or more headings for each article manufactured in the shop. The list of "regular" jobs at the present time is as follows:

SHOP EXPENSE. (See Sec. 3.)
EXPENSE ON SPOONS. (See Sec. 4.)
EXPENSE ON No. 10 HOOKS. (See Sec. 4.)
EXPENSE ON No. 15 HOOKS. (See Sec. 4.)
EXPENSE ON METER SHELF BRACKETS. (See Sec. 4.)
EXPENSE ON No. 10 BRACKET FRAMES. (See Sec. 4.)
EXPENSE ON No. 10 COMPLETED BRACKETS. (See Sec. 4.)
EXPENSE ON SCREW BRACKETS. (See Sec. 4.)
EXPENSE ON WIRE EYES. (See Sec. 4.)
EXPENSE ON CORRUGATED WIRES. (See Sec. 4.)

SEC. 3. Under "Shop Expense," charge all miscellaneous work done either in the machine shop or outside, such as moving and setting up machinery, changing pul-

Fig. 5.—Paid Stamp Used on Time Slips.

leys, belts, shafting and all work not connected directly with any operating expense as explained below.

(*To be continued.*)

THE CO-OPERATIVE MOVEMENT IN GREAT BRITAIN.

BY S. G. HOBSON.

THE retail trade of Great Britain, particularly in the large industrial centers of Lancashire and Yorkshire, is deeply concerned, and extremely hard hit by the increase in membership and the growing organization of the co-operative movement. It is true that the retail Hardware dealer does not feel its effect so acutely as does the grocer or the dry stores dealer. None the less, a great quantity of Hardware is sold over the co-operative counter. There is evidence, too, that the increase in the sale of Hardware will go on from year to year. In a co-operative handbook before me, in which hints are given as to the proper growth and development of the Co-operative Distributive Society, I observe the following comments:

a. Hardware, Brushes, Crockery, &c.—This department can be easily attached to the grocery department. It is simple to manage. The goods can be obtained from the wholesalers, who may even agree to the principle of sale on approbation or return. The stock is turned over slowly, but a good profit attaches to it as a rule.

h. Furnishing.—Some societies supply to order through the wholesalers or otherwise by means of illustrated designs. Carpets, Curtains, Crockery and Hardware may come from the Drapery and Hardware departments.

It may be taken for granted that when once the co-operative societies induce their members to buy Hardware in the same way as they now buy foodstuffs and clothing, there will be no limit to the extent of the Hardware trade done by the co-operators. This article is written primarily with the object of showing American readers one of the difficulties which retail Hardwaremen in this country have to contend with. But inasmuch as there are signs that the co-operative movement in America is spreading, it seems of some importance that the plain facts as to the origin, growth, object, methods and extent of the co-operative trade should be frankly dealt with. I suppose every retailer will agree that the co-operators did not come into business out of any sense of personal antagonism to himself. The roots of the co-operative movement in Great Britain lie deep in the political and economic history of the nineteenth century.

A Slight Historical Sketch.

The co-operative movement, pure and simple, grew in the nineteenth century, but it owed its inception to Robert Owen, who was born in the eighteenth. The life of Robert Owen is a history of one of the most fascinating of Great Britain's industrial leaders. He was a born genius in organization, and either possessed in a high degree the faculty for, or was singularly fortunate in, making as much money as he wanted. In his own personal experiences he made and spent more than one large fortune. Born in Newtown, Montgomeryshire, Wales, May 14, 1771, his father a postmaster, and his mother a farmer's daughter, he was precocious from the beginning. His parents could not afford him a higher education; he began business life early as a draper in a shop near London Bridge, London. Working for 18 hours a day his health broke down, and he moved to Manchester. At the age of 18 he went into a business partnership, and in the first year made a profit of $1500. At the age of 20 he was managing one of the finest mills in the country, and controlling 500 workers.

A Genius for Organization.

He soon was owner of his own cotton mills, and had fixed his eye upon New Lanark as an ideal place to develop an industrial community. He married the daughter of the proprietor of New Lanark. He found the place when he went there a hotbed of crime, drunkenness and immorality, but by systematic, rigorous yet reformatory rule he gradually converted the village into an exemplary social community without once invoking the aid of the criminal law. The great men of all countries came to him; deprived in early youth of the higher educational advantages, he became himself an educational enthusiast; himself having experienced the evils of long working hours, he felt keenly for the children in the great cotton mills of the north; he was energetic in support of various factory acts; he organized various industrial settlements in Scotland, Ireland and in America; he lectured in the United States, visited Mexico; and out of this varied experience sprang his conception of industrial co-operation.

Fruit of Persistent, Intelligent Effort.

By 1828 there were no less than 130 co-operative societies in the United Kingdom, the greater number of which were engaged exclusively in retail trading. Sometimes his ideas were triumphant; at other times, what with bickerings, dissensions and recriminations, they were utterly discredited. At the very moment when all seemed lost came the Rochdale Co-operative Society, generally known as the "Rochdale Pioneers"—a constitution bearing the impress of Robert Owen and avowing his objects. By selling goods at market rates to its members, and devising an equitable method of distributing the profit, these Rochdale weavers set going a gigantic distributive enginery, which from that time on has grown and still continues to grow.

Thirty-nine Years' Trading.

The following figures will give some idea as to the extent of the business transactions of the co-operative movement during 39 years. I give below the actual sales at various dates, together with the total, and the total profits, and some figures showing the statistical position of co-operative societies in Great Britain on December 31, 1900:

Years.	Sales.	Years.	Sales.
1862	£2,333,523	1896	£59,951,635
1870	8,201,685	1897	64,956,049
1880	23,248,314	1898	68,523,969
1890	43,731,669	1899	73,533,686
1895	55,100,249	1900	81,020,428
Total sales in the 39 years, 1862 to 1900			£1,163,746,108
Total profits in the 39 years, 1862 to 1900			£107,248,027

December 31, 1900:

Number of members	1,886,252
Share capital	£24,156,310
Loan capital	£12,010,771
Sales for 1900	£81,020,428
Net profits for 1900	£8,177,822
Devoted to education, 1900	£65,699

Growth in Other Countries.

It is not in Great Britain alone that the co-operative movement has taken root and grown. The Co-operative Distributive Societies of France were formed with the distinct object of implanting the Rochdale shoot on

French soil, and the leaders of the movement have adhered faithfully to the British model. But it cannot be said that the French co-operative movement is economically strong. In Switzerland there are co-operative societies, some bearing the stamp of the workingman, such as the "Fidelite," others more distinctively middle class. In Switzerland schoolmasters and professors play a fairly leading part in the organization of co-operation, and it betokens as the years go on a distinctly socialist tendency. In Germany, Austria, Belgium and Italy, in Russia and Servia, and to some extent in the Scandinavian kingdoms, as well as in the Netherlands, co-operation on the "Schulze Delitzsch" model has grown with great rapidity. In its distributive form it has admittedly copied from Rochdale, but in Germany and Austria distributive co-operation is only of secondary importance; the first place is assigned to credit.

System of Co-operative Banks.

Springing from the "Schulze Delitzsch" scheme of things has grown up a system of co-operative banks. For example, the *Banque Populaire* of Verviers in Belgium is distinctly a workingman's bank. The *Banchina* and the *Societa Operaia Maschile* of Bologna, in Italy—a very humble institution with $1 shares—are fully devoted to workingmen's interests, and have proved of great service to their members. One curious difference between the Rochdale and the "Schulze Delitzsch" models is that, whereas in co-operative societies in Great Britain the mass of the members are of the working class, at "Schulze Delitzsch" conferences broadcloth is far more noticeable than fustian. The effect goes down deeper than dress. Schulze Delitzsch addressed himself first to tradesmen and dealers, and so from the outset gave something of a middle class character to his co-operation.

Co-operation in Another Guise.

Another form of co-operation is that founded by Raiffeisen. I need not deal with it in detail. It is enough to say that Raiffeisenism has made co-operation for agricultural purposes possible, finding money in plenty for the creation of co-operative dairies and similar institutions. It has reached down to the lowest depths of poverty, fertilizing previously desert places. It deals with small consumers and satisfies small wants.

Socialistic Co-operation.

More striking than all the preceding countries is the growth of the Belgium co-operative societies, which are almost all without exception socialist. *Maisons du Peuple* have sprung up in all the Belgian towns, and are to this day in Belgium the very backbone of the political socialist movement. The Belgian co-operative societies find employment for the Socialist Deputies, find the money for their election, and are in general built up on a "class conscious" basis, in which they are frankly on the side of labor as against capital.

The Structure of the Co-operative Movement in Great Britain.

The co-operative movement in Great Britain may be roughly divided into

THE DISTRIBUTIVE SOCIETY,

THE WHOLESALE CO-OPERATIVE MOVEMENT, and

CO-OPERATIVE PRODUCTION.

First came the distributive societies, that bought their goods from manufacturers and merchants just in the same way as would a retail shop. Then, in course of time, the retail co-operative societies began to federate, hold conferences and help each other. From these conferences sprang the wholesale co-operative movement, which now supplies a considerable portion of goods to the retail societies. Thus, in 1900, the actual co-operative sales amounted to £81,000,000; of this £17,000,000 worth was bought from the Co-operative Wholesale Society, Limited. As showing the growth of the wholesale co-operative movement as distinct from the retail, here are the statistics for the last 38 years:

Annual Totals.

Years.	Sales.	Years.	Sales.
1864 (30 weeks)...	£51,857	1885.....	£4,793,151
1865.....	120,754	1890.....	7,429,073
1870.....	677,734	1895.....	10,141,917
1875.....	2,247,395	1900.....	16,043,889
1880.....	3,339,681	1901.....	17,642,082

Summary.

Total sales in the 38 years, 1864 to 1901.....	£208,163,058
Total profits in the 38 years, 1864 to 1901.....	3,073,251
December 28, 1901:	
Number of societies holding shares.....	1,092
Number of members belonging to shareholders..	1,315,285
Share capital (paid up).....	£948,944
Loans and deposits.....	£1,664,765
Reserve fund—trade and bank.....	£285,132
Insurance fund.....	£477,904
Sales for the year 1901 (53 weeks).....	£17,642,082
Net profits for year 1901.....	£288,321

Evolution.

From wholesale co-operation to co-operative production was a natural transition. This was inevitable for two reasons:

1. The stores, being banks, constantly accumulated more capital than they could employ in the shop, and the question would arise: "What shall we do with it? Shall we not employ it in our own interest in production, or must we invest it in private trade or throw it back on our members to be perhaps wasted?"

2. The wholesale societies, besides their foreign expenditure, spend large sums in England among private traders and manufacturers for all kinds of articles of domestic use wanted in the stores. The question would constantly arise, should they not manufacture and obtain for themselves, and so annex the manufacturer's profits? In the co-operative movement this has been no question of mere abstract argument; as the years go on, it becomes of pressing and constant interest.

An Interesting Subject.

Much discussion wages around the whole question of co-operative production. At the end of 1902 the sales of the co-operative productive concerns reached £2,947,061, with a share capital of £1,480,883, with net profits £156,054 and dividend on wages £20,846.

It would be interesting, and in its way instructive, to examine with some exactitude the principles underlying the productive co-operative movement. Both its principles and its methods are in many ways unique, and doubtless private manufacturers could learn many a valuable lesson from its study.

How a Co-operative Store is Started.

The way in which a co-operative store begins is usually by some workingman of influence talking the matter over with friends, obtaining and circulating tracts, and then collecting money. The whole system is based on ready money, and the shop must have ready money to pay for its outfit and its goods before it makes a beginning. Some of the committee act as collectors. If a shop is to be open all day, it is reckoned that at least £130 of capital is requisite, together with 100 members and a fair prospect of doing a trade of from £40 to £50 per week. Nothing less than this will insure payment of expenses and provide a dividend. It is usual to hold the money in £1 shares. The almost invariable rule with societies is to give 5 per cent. on all share capital, and this has proved an immense attraction to shareholders and a great strength to the movement. Sometimes, however, when there is more capital than can be employed in the store, it has been found difficult to obtain the 5 per cent. without risk.

TANGIBLE EVIDENCE OF PURCHASES.

Every time members come to buy any article, a token is taken away to show at the end of the quarter how much they have bought that they may claim their 1 shilling 6 pence or 2 shillings in the pound on their purchases, or whatever dividend may be declared. This is arranged by a method of checks or tickets made of metal or paper, which are given at the time of purchase, and which are brought back when the dividend is claimed.

THE MANAGING COMMITTEE.

When the society is registered and begins work, the first step taken is to appoint a Managing Committee. The general tendency of this committee is to overwork its employees, but this is kept in check by local sentiment—notably a sort of tradition that co-operative stores should

work less hours and pay slightly higher wages than individual competitors. The next step is to affiliate with the Co-operative Wholesale Society, so as to benefit in that business. Where a strong store manager gets control, the business usually goes with a swing, but where the committee have a weak manager, business is apt to lag. This remark, of course, applies with equal force to individual shopkeepers. Taking one consideration with another, I question whether the co-operative stores are as well managed as are the private stores.

COHESION IN DIVIDENDS.

But the difference lies in the dividend. The buyers flock to the co-operative stores to procure their dividend at the end of the quarter. Thus, if in a quarter purchases amounting to £10 take place, the dividend amounts to £1—a very considerable item to a thrifty housewife in the north of England where wages, on the whole, rule low. It is contended by private shopkeepers that they pay slightly more for their goods, and so only get back in cash what they have actually paid in cash. On this point the evidence is hopelessly contradictory, and I cannot pretend to offer an opinion.

OUT OF ONE POCKET INTO THE OTHER.

Granting, however, that the co-operative prices are slightly in excess of those charged by the private retailer, it becomes a convenient way of saving a little money, and as such the co-operative store is prized. This hunt for dividends, or "divis," as they are generally called in the north of England, has, to a large extent, defeated the original objects of the founders of the co-operative movement. But the retailer, and in consequence the private wholesaler and private manufacturer, suffer through having to give credit and by bad debts. The co-operative movement from start to finish is a ready cash proposition, and the result is that bad debts are nonexistent. Even the retail stores seldom fail. The wholesale co-operative company only make bad debts to the extent of less than 8 cents per $500.

Organization Does It.

The foregoing brief sketch of the co-operative movement is written quite dispassionately. There is no use being angry with a movement which, after all, is just as much entitled to live as is the private trader. One might as well be angry with the equator. When we fine it down, it resolves itself purely and simply into a question of convenience for the consumer.

Deductions.

If the consumer can get what he wants more conveniently, at a better price and of better quality from the private retailer, then we may be sure that is where the consumer will go; if, on the other hand, the consumer can get better terms from the co-operative store, then it is a bad lookout for the retailer. The strength of the co-operative movement in Great Britain lies in three directions:

1. It has a history tradition and spirit peculiar to itself. The consequence of this is that among artisans to "deal at the store" has a sort of social sanction which in the course of years has become a valuable trade asset to the co-operative movement.

2. Trading strictly on ready cash terms means the avoidance of bad debts, and therefore either the increase of dividend or the decrease of selling prices.

3. The growing intricate organization as between the co-operative retail distributer, the Co-operative Wholesale Society, Limited, and the Co-operative Production Societies, is a tremendous economic power which year by year grows, and year by year becomes more and more a menace to the private manufacturer, private jobber and private retailer.

How to Meet the Competition.

I have said that there is no use fighting the co-operative movement; the only way to encounter it is to meet organization with organization. The retail trade associations of this country have come none too soon for the purpose. As yet, however, the private trader is not nearly so well organized as is his co-operative competitor. There must, as the years go on, be increasing confidence and understanding between the various organizations of private traders. The associated manufacturers must more and more take counsel with associated jobbers, and they in their turn must more and more take counsel with the associated retailers. This applies to every trade. The co-operative movement is not going to stop at foodstuffs and clothing goods; it will widen its field of operations year by year. As yet the Hardware sold to the co-operators comes almost entirely from private manufacturers. It is reasonably certain that sooner or later a number of retail Hardware manufacturers will be compelled to sell out to the co-operative movement.

On a subsequent occasion I hope to deal with the great middle class co-operative stores connected with the Civil Service, the Army and Navy and so forth. The co-operative movement as described here is confined in its activities almost entirely to the artisan classes.

PAUL COLEMAN DE VOL.

PAUL COLEMAN DE VOL, senior member of the firm of P. C. De Vol & Son of Council Bluffs, Iowa, and president of the Wright & Wilhelmy Company of Omaha, Neb., died at his home in Council Bluffs on Friday, Dec. 25, of apoplexy, after an illness of four days.

Mr. De Vol was born in Chatham, N. Y., January 10, 1836. His parents came West and in 1847 located at Council Bluffs, which was then known as Mormon Cross-

PAUL COLEMAN DE VOL.

ing, later as Kanesville, and still later as Council Bluffs. His first business venture was at an early age, when, as the proprietor of a 6-foot lunch stand between two buildings, he supplied food and soft drinks to the public in the frontier town. In 1861, in connection with the late Milton Rogers, he engaged in the Stove and Hardware business, and for 42 years, without interruption, he successfully conducted the business at the same location. In 1863 he bought out Mr. Rogers and continued alone until 1882, when W. S. Wright joined him in the establishing of a jobbing business that two years later was moved to Omaha and merged into a stock company, now the Wright & Wilhelmy Company. Mr. De Vol was the first president of the company, holding this office continuously for 20 years. He was a gentleman of quiet taste and habits who found his greatest pleasure in the society of his family and a few personal and congenial friends. While never active in the conduct of the business of the Wright & Wilhelmy Company, of whom he was the honored head, his wise and conservative counsel and means were always at the service of his associates and were a strong factor in assisting them to reach the position they occupy. Conservative in his disposition, his confidence in his own opinions and in his business associates, when once established, was too deep to be moved or shaken, and as his genial disposition, which endeared him to his friends, will be missed by them, so his confidence and support will be missed and mourned by his business associates, who feel that they have lost not only a wise and conservative counselor, but a loyal and trusty friend.

Views of Hardware Manufacturers on the Outlook for Trade in 1904.

The following extracts from letters are of exceptional interest because they represent the judgment of many prominent and thoroughly representative manufacturers in important lines. Our readers cannot fail to note the generally cheerful views expressed in regard to the prospects for business in 1904.

From Manufacturers of Hardware Specialties and Household Goods:

From our standpoint the outlook for business next year is very good. Our judgment is based on the fact that on a number of articles we make for spring delivery the orders booked now are considerably larger than last year at this time. This is about the only criterion we have to judge the future by, and are planning for and expect business for 1904 fully as large if not larger than our business during the past season.

Spring Orders Now Well in Hand.

From Manufacturers of Carriage and Machine Bolts, Nuts, &c.:

Indications point to a fair increase in the volume of business over what it has been for the past six months. We feel thoroughly satisfied, with the export conditions in as good shape as they are, and the increasing balance of trade in our favor, that the general business conditions will very soon feel the effect of this, and we will be receiving more orders, but the margin of profit will not be as large as for the past two years. We confidently expect a good and growing trade for the year 1904.

Increased Business with Less Profit.

From Manufacturers of Horseshoe Nails:

Having just returned fram a trip which included New York, Philadelphia, Baltimore, Pittsburgh, Wheeling, Columbus, Cincinnati, St. Louis, Chicago and other centers, am persuaded the outlook for business next year is good. The trade generally have been reducing stocks largely during the past few months, in consequence of the depressed state of the stock market, which many business men seemed to think portended a season of dull business. It seems to me that the stock market situation is not the effect of reduced business prospects; consequently, the cause for the same must be looked for in other quarters. The business men the writer has met, many of them leading merchants in the cities mentioned, all seem to be optimistic; at any rate, they all seem to be exceedingly busy just now, and the only factor that appears to work against the placing of large orders is the natural caution that is always present when there are any adverse indications. When spring opens we expect (although not anticipating a boom) a healthy and successful business year for 1904.

Deductions from a Recent Business Trip.

From Rhode Island Manufacturers:

Confess it is a hard problem to guess upon. It is a Presidential year; politicians, majority of the daily papers, labor unions, courts of law, and the uncertainty of legislation in State and country, all combine to pull things to pieces. It requires a bold man to even think of anything except the worst.

Scents Trouble.

From Manufacturers of Bolts, Nuts, Rivets, &c.:

From the indications within my knowledge, I think the prospects for business next year are very good; not so good, perhaps, as were the indications at this time last year for 1903. After the severity of our wintry weather is over, I anticipate a revival in the demand for iron and steel products, because the underlying features of business activity, such as abundant crops, large exports and easy money, were never better, on the whole, than they are at present.

Conditions Favor Good Business Next Year.

From Manufacturers of Wire Cloth and Wire Goods:

We consider the prospects for business next year good. By that time we think Wall Street will have adjusted its "undigested securities" and labor troubles will be on the wane.

Regard Prospects for Next Year Good.

From Manufacturers of Steel Goods:

Prospects very favorable for large sales of Steel Goods this season. Farmers, North and South, are in good condition; have had good prices for their product, and outside of the large cities and manufacturing districts money is easy. Doubtless there will be some curtailment of trade, and perhaps considerable in some lines, particularly fine Hardware and other articles used in building. Building the coming season will probably be much restricted, unless the labor organizations modify their course. Matters in the steel and iron industry are being handled much better than they would be except for consolidations. Instead of contending with each other for trade at ruinous prices, they are curtailing output and reducing cost, thereby saving themselves from loss and ruination. In the South, where cotton is so largely relied on, while the crop was short, extremely high prices more than make up the difference, and the present high price will encourage planters to put in a much increased acreage. While politics and the attitude of labor organizations are most to be feared, do not look for serious disturbances from either quarter.

In Steel Goods Large Sales Expected.

From New England Manufacturers:

In our opinion there will be less demand, especially for Builders' Hardware, in 1904 than in 1903. On account of labor troubles building operations have been held up all over the country. The shrinkage in value of industrial stocks has caused a lack of confidence, and the people will not be so much inclined to go into new enterprises. Also, in 1904, will occur a Presidential campaign, and there will be a disposition to wait until after it is decided as to whether there will be a change in administration before undertaking much in the way of new business. We are therefore looking forward to less business in the home markets, and are going to push out for foreign trade.

Less Business Here; Push for More Export Trade.

From Manufacturers of Twist Drills:

While there has been a marked falling off in the amount of business done in the iron and steel trades during the last six months, and also a falling off in price on some of the steel and iron products, the business of our house has been very satisfactory up to within three or four weeks, when there has been a pronounced falling off in orders and considerable pressure for better prices. This, however, is an annual epidemic in this business, and we expect during December and January, when the Hardware trade are taking stock, to have our orders fall very much below the normal for the balance of the year. The prices of Twist Drills have been maintained firmly throughout

Anticipate Normal Business in 1904.

the year, and as these prices are quite low, no advance in the market having been made during the booming times, we do not anticipate any changes. There seems to be somewhat of a revival in the iron industries, machine tool builders being, as a rule, comfortably off for orders for the next three or four months, and considering the general situation we see no reason why we should look forward to a less volume of business next year than has prevailed for the past two or three. It is possible that there may not be quite that brisk and impatient demand for goods during the coming year, but we feel that we will have a normal business.

From Manufacturers of Cutlery:

No Serious Falling Off.

We do not look for a serious falling off in the demand for goods for next year, but we hardly think business will be as good as this year, principally on account of labor disturbments.

From Manufacturers of Hardware and Wooden Ware Specialties:

Indications point to no change in our line. Possibly we may have to work for and go after orders, which has not been necessary to any extent during the past two or three years, but are rather of the opinion that business itself will be more satisfactory.

Pleasing Outlook; Increased Proportion of Exports.

We need a little relief from the strenuous life we have been leading, and think it will not now hurt us to push the business in place of the business pushing us. We can see no prospective break in the situation, and would not be surprised if after a lull and a more or less quiet condition for the year 1904 we shall see the biggest year this country has had in 1905. We are working for export trade, and now about one-fourth of our sales go out of the country as against one-tenth two years ago. The more we can extend in that direction the more protection will we have against the eras of depression at home.

From Manufacturers of Hangers and Hardware Specialties:

We believe the prospects for business another year are good.

No Indication of Appreciable Falling Off.

No indication with us, thus far, of any falling off worth mentioning. We believe it is the duty of *The Iron Age* at this time to discourage croaking. As far as we are able to judge, most of the talk at present about business prospects emanates from pessimists and croakers. We are making arrangements for even a much larger business another year, and believe we will not be disappointed.

From New England Manufacturers:

We look for a falling off in demand for and sale of goods next season, as compared with 1903, due first to the very unfavorable weather conditions that prevailed all last summer, whereby both jobbers and retailers carried over a larger quantity than usual; and, second, to a general slacking up of business, which will have a tendency to curtail the sale of all goods. With favorable weather conditions during the months of April, May and June, 1904, we believe the sale of our goods would be fully equal to what it has been during the past three or four years, but whether the handicap of large stocks carried over by jobbers or retailers could be overcome is a very serious question, and we very much doubt if this could be done. We look for a good fair average demand for all goods in 1904, but a falling off from the abnormal demand for the past two years. From some sections of the country our orders are larger than ever before, but the average the country over is about 25 per cent. less than corresponding date a year ago.

Probable Falling Off in Demand.

From Manufacturers of Hardware Specialties:

Are pleased to report our business so far this year materially greater than for the same period last year.

Business Greater; Prosperous Farmers Key to Situation.

Under these conditions we have no cause to complain, and feel quite satisfied in view of the existing conditions. We see no cause for apprehension. The farmers in some sections are faring better than for years, and while some may say Wall Street is the pulse of the nation, we believe the heart of the structure is in the well being of the tillers of the soil. When they are prosperous it does much to counteract the effect of stock market bubbles.

From Manufacturers of Mechanics' Tools:

We have heard and read so much about the coming slack times that we have sometimes feared they were upon us; but our business, so far this year, has been our largest, and the demand has not yet ceased. Crops throughout the Middle West and greater part of South have been good, and farmers are enjoying good prices for products, so that demand for the necessities of life (as well as some of the luxuries) continues good from country districts, as well as smaller towns and cities. On the Pacific Coast, the shingle and lumber business has slacked somewhat. A blight on the business horizon during the past year has been the labor strikes, some of which still continue. This directly affected building operations, and we are sure to feel the reflex action of the shutting off of a demand for lumber sooner or later. If labor troubles cease, confidence will be restored in a large measure, and business will continue in good shape. If, however, strikes in the building trades continue, we have faith enough in the American people to believe that they will overcome the thing in some way finally, and be all the better for it, even though we may have to put up with less business for a time. We believe that our business during 1904 will be satisfactory.

Crops Generally Good and Have Faith in Future.

From Manufacturers of Tacks, Nails, &c.:

We do not dare to make predictions upon next year's business beyond the spring trade. As far as the consuming West is concerned, however, we believe there is going to be a large volume of business the coming spring, and are making preparations for it. Stocks in our kinds of goods are light, both in the jobbers' and retailers' hands, and we do not see what can hinder a large business in our lines during the spring, unless some serious financial or labor difficulties arise. Keep the child well housed and healthy until spring, and the West will give the country a big business.

Look for Large Volume of Spring Business.

From Manufacturers in Indiana:

We think that with labor troubles and the coming political campaign business in general will be affected. So far as we are concerned we look for more business and are expecting a substantial increase, solely for the reason that we are in our infancy, have not nearly reached our growth and are bound to grow some in spite of anything that may occur, barring a serious panic, which might have some effect, but which we do not expect. We are preparing to increase our capacity just 100 per cent., and expect to get the business to take care of it.

Expect to Grow Whatever Happens.

From Manufacturers of Butts and Hinges:

Viewing the outlook for sale of our own line of goods, the prospects are much more favorable than a year ago, as stocks in dealers hands are very light. While they do not want to replenish before inventory, yet orders are being received in unusual volume for shipment January 1; specified orders on our books for future shipments being larger than ever before.

Prospects More Favorable Than a Year Ago

From Manufacturers of Tacks, Brads, &c.:

It seem to us that the prospects for business for next year, especially next spring, in our line are very encouraging. Judged by the information we have from our customers, their stocks seem to be very small, as it was almost impossible for them to have full stocks of our kind of goods on hands this year on account of shortage of material as well as labor troubles everywhere.

Indications for Spring Trade Encouraging.

From Manufacturers of Housekeeping Specialties:

It has been made very evident to us that jobbers anticipate some reduction in prices of Sheet Steel Goods. Our customers, who have been in the habit of ordering in good round quantities, appear to be with us still, but are ordering from hand to mouth. All our shipments nowadays are for small quantities, and fully one-half of the orders received are marked, "Please Rush." We believe Sheet Steel is at about its lowest price and anticipate a slight advance in January. The moment that advance is announced we anticipate a rush to fill up the stocks, which are now much depleted, and on that account look for an unusually good business during the early part of the year. We see no reason why the total volume of 1904 should fall much, if any, below 1903, and the waiting attitude, which has held during the past few months, will tend greatly to strengthen the market and prevent much cutting of prices.

Present Orders Hand to Mouth.

From Manufacturers of Twist Drills:

We think it is a little too early to say very much about what next year will bring forth. We are simply one of the people who are going to believe that business will be all right.

From Manufacturers of Agricultural Implements:

It is gratifying to report that our advance sales are much larger than at this date last year, and considering that the farmer in every section of the country is finding a ready market for his products at very remunerative prices, we are sure the demand will be greater than last year. Government reports show an increased acreage of nearly all cereals, and we believe that, notwithstanding the unfavorable reports in portions of Texas, caused by the ravages of the boll weevil, the high price of cotton will result in a large increase in the numbers of acres planted in 1904. As there have been no factories in our line erected for the past four years, the increased demand will keep all of the Steel Goods plants in operation during the entire season.

Advance Sales Larger Than Same Period Last Year.

From Manufacturers of Pumps and Wind Engines:

We do not anticipate 1904 business will be as large as 1903. After carefully feeling the trade in the Middle West, we find that there is a disposition among many dealers to curtail purchases, which is caused by the feeling among farmers that there is likely to be financial trouble, which will affect prices of goods they expect to buy. Also there seems to be, among dealers, a disposition to collect outstanding accounts and get closer to their business than during the last few years, which will tend to curtail purchases. There is no adequate reason for this, as there never was a time when farmers were in better condition than at present; the banks are full of money, deposited by them, and there is no demand for it. We do not anticipate a serious falling off of business for 1904, but do believe that these conditions, together with the old bugbear, campaign year, are going to curtail purchases. We look forward ourselves to the usual business, notwithstanding campaign year, but weather conditions and fall crop prospects may change materially the conditions of business after the spring trade opens.

Disposition Among Dealers to Curtail Purchases.

From Manufacturers of Screws:

Present indications seem to us to point to a very good business for the coming year, and there has been a very decided improvement over conditions existing a month or two ago.

Improved Conditions.

From Manufacturers of Wrenches:

Ordinarily we would say that a Presidential year meant a falling off, but we find our friends hardly agree with us, and that our own business does not indicate that there will be as much falling off this year as usual in a Presidential year. The interests at stake are not vital enough to cause a suspension of industries, and we think that when the public is able to buy predigested securities it will again return to confidence in the lines which are at present fairly below their proper standing.

Presidential Year Losing its Terrors.

From Manufacturers of Files:

We are of the opinion that our business will be as good or better in 1904 than it was in 1903, for the reason that there are no stocks at present in the hands of the wholesale Hardwaremen; they have been buying very close during 1903, believing there would be a reduction in the price of Files and Rasps, which did not occur. Labor troubles all over the country prevented increased consumption of goods. A number of the "Trusts" naturally went down under the weight of their own doings, but did not, to any extent, affect our line of trade. We believe the business air is clearer now than ever; that labor unions have seen their best days, and will not in future be able to run manufacturing plants into the hands of receiver or sheriff, and that employers in most cases will be allowed to run their business to advantage, and employ whom they see fit. We are one of many who think that legitimate business, fairly conducted, will pay during 1904.

Business Properly Conducted will Pay in 1904.

From Manufacturers of Tools:

So far as we penetrate the future, it seems as though buyers will be chary as to placing large orders. Again, those with whom we have been in communication are looking forward to an increased reduction in price, and this in itself will have a serious effect upon demand. From the standpoint of to-day cannot believe we shall have near the amount of business for 1904 that we had in 1903, and then, again, believe the business will be at a reduced price. There is another matter with which you no doubt are familiar, and that is the export trade. We have every reason to believe this will be seriously affected, for the present agitation of reciprocity is having an effect. In New Zealand, as near as we can ascertain, there will be a differential duty of nearly 50 per cent. between American and English goods going into that country, and this also applies to Canada. Therefore, we are looking forward to quite a reduction in our export business.

Reduced Business at Lower Prices.

From Manufacturers in the Wire Line:

Could the business of the country be assured of none or few political changes do not believe we should see less business than we have experienced in 1903. There are several excellent indications for trade, one particularly. Some of our largest trade place orders four to six months ahead, and forwarding instructions have been received in not a few instances for immediate shipment of goods from one to two months ahead of delivery dates. Do not believe our customers ever had a smaller stock of our line of goods than at present, and we are preparing for an increased trade in 1904.

Excellent Indications of Trade.

From Manufacturers of Tacks, Brads, &c.:

We have never felt more doubtful or uncertain on any subject than regarding the outlook for business in 1904 as compared with 1903. We can find no better base to stand on for a pessimistic than an optimistic view, but we are illogical enough to think we feel it in the air that 1904 business will fall considerably short of 1903.

1904 Business Will Fall Below 1903.

From Manufacturers of Chains:

All we can say at this stage is that we are hopeful.

From Manufacturers of Window and Door Screens:

Do not anticipate any serious falling off in the demand for goods. The only trouble is overproduction in our line, and so far as we can ascertain, this is the condition in some other lines. This state of things will probably obtain until the most conservative people draw out and the weak ones are forced out, leaving the business in the hands of the strong and vigorous concerns.

Overproduction a Weak Spot.

From Manufacturers of Cutlery and Hardware Specialties:

The only reason why we may not expect as large a trade in the first half of 1904 as we had in the first half of 1903, that I can discover, is the carping and doubting pessimism of some men and some newspapers. The last half of 1904 may be affected somewhat by the excitement which usually attends a Presidential election. If the crops are good in 1904, and we get to work on the big canal, I think nothing will prevent a big business all of the year 1904.

Crops and Isthmian Canal Important Factors.

From Manufacturers of Hardware Specialties:

Believe volume of business will not reach that of 1903. Even if as much business is done, it will not aggregate the same in value, owing to the fact that many lines, especially those into which iron and steel enter, are being sold already for less money than several months ago; this alone will make quite a difference if the volume is measured in money. Also, next year is Presidential year, and our 24 years' business experience has been that it is always slack until after election; then it revives if the election goes right. We believe that the falling off will reach about 25 per cent., but hope we are mistaken.

Volume Not Likely to Reach That of 1903.

From Manufacturers of Chain:

That there may be good business during next year it is necessary to know, first, the ability of the general public to make purchases; and, second, the condition of stocks of manufactured articles. The first question is answered by the excellent crops, particularly in the South and West. As to stocks of manufactured goods in the hands of manufacturer and jobber, owing to declining values of iron and steel articles within the last six months stocks in the hands of jobbers must be abnormally low, judging by their conservative purchases in the last half of 1903. Manufacturers have been, as a rule, equally conservative in their purchases and free sellers of their products. Few goods have been made up into stock, the factories having been practically running exclusively on orders. Until midsummer, the tendency had been to pyramid costs by increased labor charges, but the pendulum has begun to swing the other way. With the price of raw material and finished product very much lower now than at any time within the last three years, the buyer has an opportunity of purchasing his wares at extremely low prices, and we confidently look for a good, strong, healthy demand for the first six months of 1904. We cannot express any opinion for the latter half of the year, mainly on account of the usual unsettled effects of the Presidential election.

Expect Good Demand for First Six Months.

From Manufacturers of Firearms:

Anticipate a considerable falling off in the demand for our line of goods, especially Revolvers, in 1904, as compared with the first nine months of 1903. As compared with the last three months of 1903, we think it will be 100 per cent. more. In fact, if it is not more than this we shall be very much disappointed. You are aware that cities and States are trying to make the Firearms business anything but easy to handle and sell goods. Not but that we are in a legitimate business, but the difficulty arises from the use to which some of the arms are put. Our judgment is that business for 1904 will be about the average of any group of four years in the last 16.

Legislative Tendencies Against Promiscuous Firearms Trade.

From Manufacturers of Tinware:

We do not feel pessimistic concerning 1904. While we believe that the demand will not be so insistent as last year, we think there will be enough business to keep every one fairly well occupied. The condition during the past two years has been an effort on the part of everybody to try and take care of a trade which has been in excess of their ability properly attended to. We believe that the condition next year will be that this excess will be wiped away, and that the demand will be more nearly related to the supply, with a more satisfactory state of things in many respects in consequence.

Demand More Nearly Related to Supply.

From Manufacturers of Hardware Specialties:

Business now is very light. There is some disposition to contract for certain lines for the first half of 1904, but there is a tendency to defer buying as long as possible, and there is a general feeling that prices on the goods we make are going to be lower. It is interesting to note, however, the particular articles we make were never lower in the history of the trade than now, and if this is true to any extent on other made up goods we do not see how, in view of the considerably higher cost of material and labor, there is going to be much chance for a reduction in prices.

Business Now Very Light.

From Manufacturers of Agricultural Implements:

Although the dealer will undoubtedly think the second time and that attitude will be shared in by the jobber as well as the consumer, we believe the interior of the country is so prosperous and money so plenty for conservative wants that business cannot help but be reasonably good and satisfactory. The demand for 1904 will naturally be considerably less than for 1903. The energy of the American people is truly wonderful, and so great that the time inevitably comes (which seems to be here now) when conservativism must prevail for such leveling up as will be safe. It will undoubtedly take some time, but will not be on a dangerous basis in our judgment because of the favorable condition of the country.

Great Faith in American People.

From Manufacturers in Ohio:

In the way of our goods for agricultural purposes distributed through Hardware houses the outlook seems to be fair, but do not look for quite as large business as we had in 1903. Taking the business altogether, including sales to manufacturers, while we do not expect a big slump, we are not looking for as great a demand for 1904; partly because it is Presidential year, but mainly because we feel the influence of a sagging iron and steel market, as the purchase of our product generally goes hand in hand with the purchase of iron and steel that is used in the production of tools, implements and machinery.

Outlook Fair, but Diminished Output.

From Manufacturers of Sewing Machines:

Concerning business, consider outlook for another year very bright, and every indication points to a large business in our line for 1904, at least until July 1. The business at present in fine condition. Running to our full capacity and are several thousand Machines behind orders. Collections never better than they have been within last three months, even though there has been hue and cry about the tightness of money, which has existed mainly among speculators. I have been in this business for 37 years, and never saw it in a healthier condition than at the present time. We have had bountiful crops in this section, except an occasional spot in West and Northwest. Crops have been above normal, and that always means good business in our line. While it is true that trade was lighter early this fall than usual, it has been growing stronger as the season advanced; at the same time the weather has been favorable for securing crops, and the winter has been perfection to date. We have had the least calls for extension of accounts this fall that we have had before in several years, and so far as we are able to judge, and our judgment is based on the actual business we are doing at the present time, the future is very bright in our line, and we believe it is the same in a great many other lines. There would have been no occasion for the slump we have just passed through had it not been for the overcapitalization and the speculation in stocks of doubtful value. The craze for forming trusts was carried to such an extent that it became topheavy, and it was a fortunate thing for legitimate business that it got a setback. One of the main causes for decline in iron and steel trade has been the course, taken by labor organizations. In Chicago and New York, and all large cities, labor organizations have been on strike, and to such extent that it cut down tremendously the demand for iron and steel.

Business Excellent, Collections Never Better.

From Manufacturers of Paints and Colors:

While our customers are all a little more conservative in their purchases than last season, we think it is due more to the agitation that exists on account of labor troubles than through any business depression, and that when the painting season opens business will be forthcoming; do not look for a great falling off in trade. It is, however, too early in the season to give much information, as what business we do now is with people who have confidence in what the future will bring, and are buying on the strength of it. Our salesmen report that, with the exception of the cities where labor troubles exist, as in Chicago, the outlook is very good.

Conservatism Due to Labor Troubles.

From Manufacturers in Michigan:

If the labor element will come off their high horse and "be good," we shall, in our opinion, have a very fair demand for goods the coming year. We do not expect the same booming trade that we have enjoyed for the last two years, as conservatism seems to be the general tendency. However, barring labor troubles, not even a Presidential campaign will cause a panic, as the Western farmer, having reaped good crops the last few seasons, has plenty of money, and is accordingly prosperous.

The Farmer Prosperous.

From Manufacturers of Wrought Iron Work:

Although next year is Presidential year, and usually exerts a bad effect upon trade, considering what should be the natural demand of the country, we cannot see why there should not be a large trade, if not interfered with too much by labor troubles. The country generally has had good crops, and farmers are prosperous, especially in the grain growing sections. The South and Southwest, which depend upon cotton, are short on the cotton crop. We have a representative just back from Texas, who says they have not money enough down there to buy Paint, let alone anything to put it on. That where there should have been a bale of cotton to the acre, it has taken about 15 acres for a bale. But in the grain growing districts there is an abundance of crops and good prices, and this should bring good trade from these sections. Eliminating the Presidential election, the cotton failure and stock speculations, the balance of the business of the country should be good.

Politics, Cotton and Stock Speculations Weak Spots.

From Manufacturers of Mechanics' Tools:

We are confronted with conflicting impressions. Considering the situation as a whole, cannot see why there should not be good volume of business during first six months, at least, of 1904; although find disposition of most buyers, great and small, to cut down specifications. If this is done universally to an appreciable extent, it will necessarily affect the volume of trade. Our business for the past six months is about the same as last year. Do not look for any increase over 1903; if we hold our own, or pretty nearly do so, during the coming six months, will be satisfied. Our line is peculiar. As it is not of a speculative character, the retailer is apt to adopt a hand to mouth policy in buying, therefore we shall not be confronted with large stocks in the hands of our customers. There seems to be a disposition among some manufacturers to throw a mask over the actual conditions, because they feel that a frank acknowledgment of a falling off would not help matters. If credits are in as good shape as people in a position to know think they are, the sailing should be pretty clear after the holiday season. To quote an expression of an iron and steel official in New York a few days since: "The large buyers are in a prime buying mood." Let us hope they will so continue for some time to come.

Conflicting Impressions.

From Manufacturers of Horse Nails:

The demands for our product are much larger thus far than during the same period last year, or in any previous year, and the indications for next year's business are that there will be an increase rather than a decrease. These conditions, however, are perhaps not dependent exclusively upon the general business situation.

Increased Business.

From Manufacturers of Garden Implements:

While the Implement jobbers and dealers are buying more cautiously this year than ever before, and necessarily placing smaller contract orders, yet we firmly believe the excellent condition of the farmers generally cannot help but cause a good demand for our goods this coming spring. Although a time of depression may be at hand, yet we take courage in the fact that history has proven that the farmer is the last one to feel the effects of bad times and the first one to feel the effects of good times. While our business at the present time, beginning with July 1, 1903, is not as large as a year ago, both with respect to sales and contracts made, yet we believe there are no indications of a serious falling off in the demand, and that the business on the wind up, June 30, 1904, will be as favorable as last year.

Excellent Condition of Farmers.

From Manufacturers of Paints and Colors:

While the next is a Presidential year, and there seems to be a general impression that under such circumstances the minds of business men and others are drawn away from their legitimate calling, we have noticed that elections don't have near the influence that they were supposed to exercise in the past. We also recognize that the labor difficulties and uncertainties have curtailed to a serious degree the undertaking of new operations, yet, notwithstanding this, we think the general condition, outside of certain influences, is very healthy, and particularly so from the standpoint of the great wealth producer—the farmer. Surveying the field generally and balancing one condition against another, while we don't look for a

Healthy Business Increase.

great business boom, we see no reason why there should not be a healthy, and, considering the growing demands of the country, an increase in, business the coming year.

From Manufacturers of Files:

No Falling Off in Demand.

See no indications that would point to a serious falling off in the demand for our goods; everything points the other way so far as we are concerned.

From Manufacturers of Cast Iron Goods:

Prospects for 1904 Very Bright.

Prospects for business for next year look very bright for us, and we can see no falling off as yet. We are booking orders every day for delivery for goods next year as late as May.

From Manufacturers of Machinists' Tools and Forgings:

We believe that the prospects for business for 1904 are good. There is a falling off in orders at the present time, but it is no more than is customary at this season. While we cannot specifically state our reasons, we think that business for 1904 will be fully as good as for the present year.

1904 Business to Equal 1903.

From Manufacturers of Carriage and Other Bolts:

We are looking for a good trade at low prices. We do not anticipate a slump by any means, but following the lines of inevitable changes, we believe we are now in that period commonly referred to as "dull or unprofitable times," following an unusual period of activity. According to the law of economics we cannot hope to have "good times" always, but with the country at large in a healthy condition, with good crops and other favorable tendencies, we look for a satisfactory amount of business in 1904, especially when, as we believe, the iron and steel market settles to a lower range of prices, which no doubt can be depended upon to occur early in 1904. We think the demand in 1904 will be equal to, if not greater than, during the year just passed, but that all business will be done on a basis of prices lower than 1903, margins necessarily close, and labor strikes not so numerous as during the past year or two.

Good Trade; Lower Prices.

From Manufacturers of Anvils:

Think prospects for business next year are fair. We expect good business during the spring, with a gradual slackening until after election. We certainly do not anticipate any serious falling off in demand; on the other hand, we do not expect business to be anywhere near as brisk as it has been during the past few years.

Less Than Previous Years.

From Manufacturers of Chains and Specialties:

In view of the Presidential election, labor uncertainties and the gloomy condition of the stock market and its attending results, which now reaches among the people to a greater extent than it ever did before, think we cannot reasonably expect trade to be any better. In view of the good crops, fairly flourishing general condition, easy money market and pretty good assurance that condition of Wall Street is not likely to be any worse, but naturally bound to improve with the opening of spring, I am inclined to think that trade will hold its own with the past year.

General Conditions Encouraging.

From Manufacturers in the Wire Line:

Just now all the buyers seem to be confining their purchases to immediate requirements, not having faith that the bottom has been reached. It is apparent, however, that this policy will soon cause a depletion of stocks, and it would be fair to judge that in January and February orders of some size must be placed in order to take care of ordinary current business. The setback in the building business, caused by trouble with organized labor, has undoubtedly been a great factor in creating such a falling off in the demand for material as has been witnessed in the last three months. It is problematical as to the time when the building trades shall recover from their setback. Am inclined to think that it will not fully recover until the contractors have demonstrated beyond peradventure that they can conduct their business independently of the unceasing and unreasonable demands of the labor unions. There is always the old croaker who insists that we shall not have a good business during the year of a Presidential election. Am inclined to believe that the American people have reached a point where a great political contest, while in measure of absorbing public interest, will not be permitted to interfere with the business of the country. Generally speaking, I look for a fair business in the coming spring and summer, but do not look for an extraordinary revival. This, I hope, may come about a year later.

Look for Fair Business, Spring and Summer.

From Manufacturers of Drop Forgings:

Our business is mainly with manufacturers, and we believe that their large increase in productive capacity of late is responsible for the somewhat overstocked market, and that this condition, with the recent decline in the cost of steel, has influenced the present slight falling off in our business. We anticipate, from the general conditions prevailing throughout the country, a good business for 1904; but, with a tendency toward lower prices, not so great a demand as has been this year.

Expect Slight Shrinkage in Volume and Price.

From Manufacturers of Lawn Mowers:

Were I to predict the business for the coming year on the orders we have booked, would say that it will be "booming," as our orders on December 1 were 64 per cent. more than corresponding date of last year, but, basing it on the general reports and such information as drifts into our office from the traveling men, my judgment would be that there will be no material difference in general business from what there was last year.

Orders Booked Exceed Last Year's.

From Manufacturers of Fine Mechanics' Tools:

We feel that eventually trade will be good, in the ordinary sense of that word. We do not look for an overflow of orders, such as has been experienced at times in past years, but an amount of trade which will be steady and satisfactory in every way. Whatever lull has occurred of late months in the machinery business has been due to the timidity of buyers, which is gradually passing away; and as for the supply business, it seems to keep up quite well, and will continue to do so, as far as we can judge.

Satisfactory Trade.

From Manufacturers of Files:

We consider it a little early yet to clearly predict conditions that will prevail after the opening of spring trade. However, we can see no cause for uneasiness as to the volume of business in the aggregate for 1904. We are already finding many of our largest and most careful buyers anxious to contract into next year at present figures. Many of them also are sending in before inventory liberal specifications for delivery soon after January 1. We look forward to a large trade for 1904, and while it may not be equal to that of the present year, it will, in our opinion, compare favorably with the largest years in our history.

Largest Buyers Anxious to Contract at Present Prices.

From Manufacturers of Wire Articles:

We look forward to a good business next year. It is true, customers are not anticipating their wants as they

did last year, but we think this is owing largely to the fact of the widespread talk of low prices. We have found, up to this time, the demand for goods has been as great in tonnage as it was a year ago. We have no reason to suppose that consumption the coming spring will not be satisfactory. The large buyers are not placing and probably will not place quantity orders, but we feel sure that the small orders, which come oftener, will show as much volume as the tonnage of a year ago. We shall be very much disappointed if the coming spring does not yield a good crop of orders.

Tonnage as Great as 1903.

From Manufacturers of Agricultural Implements:

So far as our own business is concerned, we shall be well satisfied if we receive the same volume of business during the coming year that we have had this year, and we should not be at all surprised, owing to the condition of business in general and the fact that it is Presidential year, if our volume was somewhat less than the year just closing. We do not think that our business will be affected as much as some other lines, as the farmers throughout the country have, as a whole, had several years of fairly good crops, with fair prices, and are in better condition to make purchases than they have ever been before.

Not as Much Business Next Year.

From Manufacturers of Refrigerators:

We speak of our own business only when we say that the outlook for 1904 business is very encouraging. We have to date booked more business for 1904 delivery than in any previous year at this season. We have every reason to believe, at this writing, that our factory will be run at its fullest capacity throughout the spring and summer of 1904, and that we shall sell every Refrigerator which we can produce.

More Orders Booked Than Ever Before.

From Manufacturers of Hardware Specialties:

Our business has been coming in rather slow for the past two weeks. From all we can learn, however, this is only because people are waiting, looking for lower prices, and we believe business will be very much increased after the first of the year. We have a large amount of orders on hand for shipment during the first four months. Jobbers, as a rule, have ordered about the same quantities as in former years. Unless there are large strikes to interfere with business, we believe that in the spring there will be a shortage of goods, as we cannot see how it will be possible to have dull times when crops are good and bringing good prices.

Large Orders for Early Shipment.

From Manufacturers of Brass and Copper:

We have noticed within the last three or four weeks that a considerably better feeling has existed, and we look for a fair year, possibly not as big as the one that has passed, but we do not expect to see any marked falling off.

Better Feeling.

From Manufacturers of Lawn Mowers:

The indications for business with us for the coming year are of brightest hue. Indeed, "indications" does not express the outlook as, with orders already in hand, we are assured of the largest business in our history of the past 25 years. This condition of the trade is caused by the extremely large demand for goods of our manufacture (other makes as well) the past season, and we have no doubt that all makes of Lawn Mowers are in good demand by the trade.

Largest Business in 25 Years' Existence.

From Manufacturers of Rubber Goods:

It is our opinion that trade will not be as good during 1904 as it was during the first eight months of the year 1903. Since September 1 of this year there has been a very marked falling off in the Mechanical Rubber Goods business throughout the country, and we do not anticipate any material improvement in this respect until, perhaps, the spring of 1904, when trade may revive to some extent temporarily. As we see things, we doubt if business will, generally, be as good as prevailed during the early part of this year, until the spring of 1905.

Marked Falling Off Since September.

From Manufacturers of Carriage Axles:

We do not feel that there will be any serious holding off, as do some of the manufacturers in our line. However, we do not expect as large sales in 1904 as in 1903. We think there will be a fair volume of business, providing nothing new turns up to injure the confidence of buyers.

Reduced Sales in 1904.

From Manufacturers of Edge Tools:

In our own business we are still exceedingly busy on back orders, and up to the present time have experienced very little diminution in volume of orders, this slight falling off not being perceptibly more than is usual at this time of the year, when preparation for January stock taking customarily reduces orders from dealers to the minimum for a month or two prior to inventory on that date. There appear to be no indications of a marked falling off in the demand for next year as compared with the present year, although we anticipate a quieting down of trade incidental to Presidential election year, and also to some extent on account of the check in building operations owing to labor disturbances which have prevailed in some sections of the country, and the retarding influence upon new industries of the shrinkage in stock market values. Still we do not see any reason for a serious setback or falling off in demand, believing the trade of the country to be in a healthful and normal condition.

Little Diminution in Volume of Orders.

From Manufacturers of Shovels, Scoops and Spades:

We expect to do as much business in 1904 as in 1903; in fact, if present indications hold out, we believe the business of 1904 will exceed that of 1903. There seems to be a growing confidence among the trade, and we look for a good year's business.

1904 to Exceed 1903.

From Manufacturers of Sash Weights:

Have great faith in the business sense of the people of the United States and believe that they will not return to a condition of demoralization, such as has happened several times in the past. The low prices which have prevailed in the pig iron market and in certain other lines have been brought about by the fact that people got scared, refused to buy, and the normal stock which should be carried in the yards has been consumed, and now we are at a point where the foundrymen and others using this material must purchase. There is one grade of material that for years has had a range of price from $14 to $18 per ton; during the last two months it was impossible to get an offer for it at any price. Am now informed that within a few days orders for large quantities will be placed at $14. Those having this material simply held it until the market was ready to receive it, and no demoralization has resulted; whereas, if they had attempted to push it, the price would not have exceeded $4 a ton. Business apparently has not dropped off, and in the building line the month of November showed an increase of 25 per cent. over November of 1902. We believe in good business for 1904 and at fair prices; the present scare is about over.

An Optimistic Horoscope.

From Edge Tool Manufacturers:

We see no indication of a serious falling off in our business for the coming year.

From Manufacturers in the West:

We expect a good business during the next year, but quite a falling off in demand as compared with 1903. Up to December 1 our business this year was the largest in our history. For several months past, however, we have noticed a decline in part of our line, which has become very marked during the present month. We anticipate, however, an active trade as soon as the public is convinced that bottom prices for metals have been reached—not before that. Will add that our collections have never been better than during the last few months.

When Prices Reach Bottom

From Connecticut Manufacturers:

We think there is going to be a very good business next year. The Western people say that with the farmers out of debt, and more money in their pockets than they ever had before, and with a crop not yet even sold, they look for a big business next season. We feel a good bit the same way ourselves.

Look for Big Business.

From Manufacturers of Wire Cloth:

We expect the coming year to prove one of the largest in volume of business we have ever had. We have closed all our contracts for season's goods, and they are the heaviest in our history. Specifications now coming in applying on these contracts are up to and, in fact, exceed in volume all corresponding records. The writer made quite an extensive trip in the West. All reports from salesmen indicate a very good business for jobbers, and an expression on their part of a continuance, the only exception being East, especially New York City. So far as the other departments of our mill are concerned, our orders are ahead of the mills three to four weeks, which is exceedingly good at this time of the year, and equally as good as the condition which prevailed last season at this time. We know of no reason why we and other Hardware manufacturers, and the Hardware trade in general, should not enjoy a good business year.

Contracts Closed for Heavy Year's Business.

From Manufacturers in New Jersey:

Quoting from the address of Archer Brown of Rogers, Brown & Co., on "Booms and Reactions in Iron," in *The Iron Age* of December 17, in the paper read before the New England Foundry Association, the last four or five lines of his argument seem to us to state the case: "Real wealth increased, credit not unduly extended, confidence not broken, energy of the people undiminished and finances sound." He points out also that we are not in the same shape as in 1873 or 1893. The crops of the country during this last year will sell for $5,000,000,000, and for the last five years, five times five, or $25,000,000,000. They have all been disposed of at good prices. This has made, as Mr. Brown says, a real increase of wealth, and enabled people everywhere who wanted to to pay their debts and so diminish the credits. As banquet speaker said, the pause is psychological, not logical. The little pause that has taken place just now is more due to the behavior of labor than anything else. This, plus the overcapitalization of such a company as the steel company. The conclusions we draw are, that there may be some further pause, but not a serious one; that the rank and file of the people everywhere will have money to spend and will spend it.

Pause Psychological, Not Logical.

From Manufacturers of Steam and Gas Tools and Supplies:

We do not share the belief of many parties who think that we are on the verge of a serious business depression. The labor problem is, of course, an important factor to be regarded, and as we see it much will depend upon the future attitude of the labor organizations. We see no indications of trouble in that line in our own shop. The Presidential election cuts some figure in the business of the year; but, on the whole, we expect a fairly good year in our line, and are making preparations for it. Business with us is unusually good for the season.

From Manufacturers in Tennessee:

The outlook for the coming season seems to be encouraging. We are not anticipating, and the indications do not point to any falling off in the demand as compared with 1903. We have no sympathy with the prevailing idea, and our comparisons do not show that the Presidential year will not compare favorably with other years in the distribution of merchandise.

DEATH OF HENRY A. MATTHEWS.

HENRY A. MATTHEWS, formerly of the Matthews & Willard Mfg. Company of Waterbury, Conn., and later of the firm of H. A. Matthews & Co. of Seymour, Conn., died at his home in Waterbury, December 31, at the age of 78 years. Mr. Matthews was born in Goshen, Conn., the son of a machinist, and at the age of eight years began work in a cotton mill. When 13 years old he removed with his parents to Waterbury, and after five years' employment in a textile plant began the manufacture of Saddlery Hardware, Stove Trimmings and similar lines. In 1865 poor health compelled him to retire to a farm, but five years later he returned to Waterbury to become a member of the firm of Matthews, Stanley & Co., manufacturers of Hardware, Saddlery Specialties, &c. Later, upon the death of Mr. Stanley the firm became Matthews, Willard & Co., and conducted an extensive business. In 1891 Mr. Matthews established at Seymour the firm of H. A. Matthews & Co. Two years later he retired, to end his years on a farm. Mr. Matthews was prominent in public life, holding several important offices, including two years as Mayor of Waterbury.

WAGNER MFG. COMPANY.

THE Hardware specialty manufacturing firm of Matthias-Wagner Company, Cedar Falls, Iowa, owing to their enlarging business and additional facilities required for the contemplated increase of their line in the future, have found it desirable to incorporate under the name of Wagner Mfg. Company, with a capital stock of $15,000, and the following officers: A. Wagner, Cedar Falls, president and treasurer; G. H. Wagner, Baltimore, Md., vice-president, and W. H. Merner, Cedar Falls, secretary. The president, who will have active management of the business, has been in the Hardware business all his life, starting in when a lad in a retail store, and after that for ten years with Wm. H. Cole & Sons of Baltimore as salesman. Subsequently he spent three years with Simmons Hardware Company of St. Louis. The policy of the new company will be to bring out nothing but up to date Hardware Specialties of merit. They have but recently erected a new building, and have equipped it with a line of machinery suitable for turning out their work.

FRED. BUCK, vice-president and general manager of the Lufkin Rule Company, Saginaw, Mich., arrived in New York, January 3, by the steamer "St. Louis" from a business and pleasure trip to Europe begun last September. While away Mr. Buck established a London branch at 48 Lime street, E. C., in charge of W. C. Bexfield, as previously announced in these columns. Mr. Buck about a month hence expects to return to England, although not for so long a stay as on his last trip. Mr. Buck thinks Great Britain and the Continent are good markets for the company's goods, and is of the opinion that the industrial situation is not depressed to the extent that some have believed.

THE entire factory and offices of the Adam's Steel & Wire Works, W. J. Adam, proprietor, Joliet, Ill., were destroyed by fire December 27, causing a loss about $40,000, on which there was about $13,000 insurance. The plant will be rebuilt as soon as weather will permit. The company expect to be in a position to fill orders shortly, having secured a building for temporary use.

THE HARDWARE OUTLOOK FOR 1904.

In the following reports from correspondents throughout the country a mass of information is presented to the trade in regard to the conditions prevailing in the various States and Territories relating to the prospect for business next year. The advices are in all cases from representative Hardware merchants, most of whom do a retail business, but in some cases a jobbing trade. Our correspondents are thus in close touch with business interests in their various communities, and have exceptional opportunities for judging of the prospects for business during the coming year. It will be noted with gratification that, on the whole, the reports reflect prosperous conditions, and that our correspondents take a hopeful view of the outlook.

NEW ENGLAND STATES.

Maine, Massachusetts,
New Hampshire, Rhode Island,
Vermont, Connecticut.

From Hardware Merchants in MAINE:

The demand for goods in this part of our State has not been quite up to the average. Stocks of goods are somewhat larger than a year ago. Collections are good, better than for years. People are prosperous and contented; employment for all; no strikes or labor troubles have interfered with manufacturing; good crops have given the farmers more money than for years, and they are paying up former arrearages. The building prospects for next year are not encouraging, but it is early yet to forecast the future. Several new enterprises are talked of—steam and electric roads, in addition to those we have. Shipbuilding fairly good.

We notice a slight increase in demand as compared with other years. Stocks are light and collections fair. People are generally prosperous and labor is fully employed. The financial condition of farmers is good, but building prospects are poor. Local strikes and unreasonable demands of members of the unions interfere with building operations here.

We have had a larger volume of business than ever before, but think profits not so good. Stocks are reduced low in most lines. Collections are very fair. All labor that desires work can obtain it. The farmers are in exceptionally good financial condition. Cannot say as yet what prospects for building and new enterprises will be. We do not see why we should not have an extra good year in 1904.

Our trade has been better than last year, because farmers have had good crops and have received good prices for them. Having money, they have used it to improve their buildings, build new ones, and show a general prosperity. On the whole, collections have been very good, and we think the trade are carrying their usual stocks. As a general thing the farmers are prosperous, and with the good prices they have been getting for produce are preparing to put in larger crops for another year. There are quite a number of new buildings to be erected in this vicinity, as well as in the county, and new enterprises of various kinds all over this section near the railroad. Work is plenty for those who wish it, and good wages are being paid for teams and men for lumbering, which will be more extensive this winter on account of the fires in the woods last summer.

General business, good; smaller volume for the year owing to light trade in Builders' Hardware. Stock of staples lighter than usual on account of uncertainty of values in near future. Collections fair. Indications are good. People are not complaining. Labor question is not disturbing, and the farmers are forgetting their failure in corn and their light apple crop. Locally, the prospect for 1904 is for better busines than we have had this year.

From Hardware Merchants in NEW HAMPSHIRE:

Trade has been good in this section the past year. Farmers have had fair crops, the mills here have all been running on full time until about a month ago two of the woolen mills shut down for a short time. One of them has resumed work on full time, the other is to do so soon. The other mills here are especially active. Collections are fair. There is prospect of fair trade the coming six months. Labor is fairly well employed. Farmers are in good financial condition. The holiday trade has not been as good as last year.

We noticed a larger demand for goods in 1903 than in 1902, the shoe industry, which is our chief business, having improved the past year. Stocks of goods are not much reduced from a year ago, but the tendency is to reduce them. Collections are very good. The indications are for a good business for the next six months. Labor is fully employed, and the financial condition of the farmers is about an average one. We know of hardly any new buildings contemplated. Business looks promising for the next few months, but there seems to be a tendency to go slow and look for dull times some time in 1904.

Fall trade has fallen off from last year. We think stocks are running low, on account of falling market. A year ago at this time we had our orders all placed for spring stock, now we are waiting and watching the market. Collections are very good, better than the average for the last two years. The farmers are in a better financial condition than for several years. Labor is well employed, and lumbermen are finding it very difficult to get men for the woods. Very little new work is in sight for 1904.

Demand the same as last year. Collections are good while stocks are light. All depends here on the cotton situation. Labor will be sure of employment this winter. No building of moment in prospect, but plenty of repairing old buildings. Farmers are in good condition and prosperous.

From Hardware Merchants in VERMONT:

There has been more of a local demand this year for General Hardware, Paints, Oils and Varnishes than for several years. Part of this extra demand can be attributed to special influence in the way of fires in this and surrounding towns and consequent rebuilding. Our stock is about as usual this time of year, and collections about normal. Local labor is fully employed in all industries, and the people seem fully as prosperous as at any time in the past three years. The farmers have suffered some from the poor hay and corn crops, but they have continued to buy freely of building materials and Implements. No new building in prospect or new enterprises in view at present. While we anticipate a slight reaction from the business pressure of the past two years, enough to warrant more careful buying and closer collections, yet we anticipate a good average business for the coming year, and we see nothing at present in local conditions to cause any business depression.

Business in our line has been very good, rather better than for several years past. Stocks are fairly well as-

sorted, but not large, the tendency being to buy often and in smaller quantities. Collections are very good. The people are prosperous, as a rule, labor having been employed to its full extent during the past season at good wages. The farmers have had good crops, except corn, which was short. They have found a ready market for all their products at good prices, and have had money to pay for what they bought. There is very little new building in sight just now, but it is early now to say positively what is the outlook for spring business, as we have a long winter before us.

Business has been good in 1903. We carry the usual amount of stock the year around, but intend to buy low the coming year. Collections are fair. It is hard to tell just now what the prospects for 1904 will be. Farmers are in fair condition.

Trade has been good for the year as a whole. Farmers have been fairly prosperous, and have been good buyers. Stocks are not heavy, collections fair. We are looking for a steady business the coming season, but building will be light. Labor is well employed.

General trade for 1903 has been larger than in previous years, which we feel is wholly due to the general prosperity of the country, which fortunately in our section has not been interrupted by strikes or other business disturbances. Stocks are somewhat lighter than usual in anticipation of lower prices prevailing in 1904. Collections, as a whole, are fairly satisfactory. Labor is very well employed at good wages. Farmers are obtaining good prices for their produce and paying their bills promptly, which indicates their prosperous condition. We choose to be optimistic in our views of the future. We feel that with lower prices already assured there will be the usual amount of building during the coming year. Of course, our national election will somewhat affect business, but the average man has learned that it does not take six months to vote for President, therefore we look forward to a good year.

From Hardware Merchants in MASSACHUSETTS:

Demand for the first six months of the year was about equal to 1902, but the last six months were not as good. Trade is small, with no large items. Stocks are light, and collections slow. Building last year was killed by strikes. If labor knows its place and stays there 1904 will be better than last year.

Business for 1903 has run on an even keel; no boom in anything. Reduction in price of certain lines appears to stimulate buying. This is noted in Shovels and Scythes. Stocks are medium, and merchants are purchasing in small quantities. Collections only fair. Mill hands are well employed, but financial condition of the farmers is only fair. Crops poor, except hay, which requires several months to turn into cash in the ordinary way. No new building in sight, and no new enterprises proposed for 1904. Opinion in this section is that it is not a good time to build, material being too high.

As compared with other years, we have had a good demand for goods, and our trade is ahead of last year. The mills in this locality have had a good business, and labor is well employed. Stocks heavy in most lines; collections slow. People are generally prosperous, but everybody is afraid we are going to have hard times, therefore they are very conservative and not putting out any more money than is absolutely necessary. Labor well employed. Farmers feel poor. Prospect of building and new enterprises not very good.

It is fortunate for this vicinity that Hardware stores keep a small department store, as the building was stopped by strikes of carpenters, painters and masons. They were all unsuccessful, but stopped new building. Trade, however, has been fairly good, and perhaps more profitable, as more goods were sold to consumers and at a better profit. Stocks, I think, of those who looked ahead, are not heavy. Collections are good. I should say there would be more building next year. The mechanics went back and jobbing work has been brisk. Farmers are in good shape. Outside of this town considerable will be done by manufacturing concerns.

We have had a very satisfactory year. Shoe and rubber business in our town has been excellent; in fact, all manufacturers have been busier than usual. Collections are slow just now. The citizens are quite prosperous and labor is well employed. The unusual seasons hit the farmers pretty hard in our vicinity, most of their crops being a failure. At this time it is hard to predict how things will be after April, 1904; everything in this locality looks well until that time.

The demand has been good and equal to past two years, excepting in Builders' Hardware. For the past two years very little building has been done in this vicinity. Stocks are lighter than a year ago, and are still being reduced. Collections are slow. Labor has been well employed this year up to within two months. Machine shops have been quiet, but more business has been coming in lately. The condition of farmers is fair. It is too early to assume what the building will be for 1904. It seems to us there is a better feeling in regard to business for 1904 than there was two or three months ago, and considering it is Presidential election year, we believe we shall have a fairly good business.

Our business has been somewhat smaller than in 1902, owing, we think, to local conditions and not to any business depression. Building operations, according to the compilation of a local paper, have been 30 per cent. less than in 1902, and 35 per cent. less than in 1901, and this on account of high cost of labor and material. On the other hand, our mills have had a moderately successful year, and our country and farmers' trade has been excellent. The city has been employing a large number of men in public improvements, and there has been no sign of adversity and no increased demand for charity. The labor problem is, therefore, our "fly in the ointment," and if this were adjusted there would appear to be nothing in the way of a satisfactory business in 1904. There is, however, a general report from our merchants, now in the rush of their holiday trade, that a much more conservative spirit in buying is being exercised, showing some apprehension as to future supplies of money, or a desire to husband well that now in hand. Stocks are not heavy, and collections rather slow, but perhaps not more so than usual at this time of the year. The dividend disbursements of our banks and manufacturing establishments about January 1 will put some thousands of dollars into circulation again. On the whole, we have pleasure in reporting a generally satisfactory condition of affairs.

From Hardware Merchants in RHODE ISLAND:

The demand has been greater this year than for many years, resulting from natural growth of the country. The only feature against prosperity is labor trouble. We think all of the trade are stocked as full as money at hand will allow. Collections are good. Everything looks reasonably good for the next six months. Labor is quiet and being crowded down every day, particularly in the cotton industry. Many are out of work, perhaps 20 per cent., so there are now no prospects of a strike. Building is only heard of now in extreme cases.

The latter half of the year has been poor, less than in other years. Labor unions have affected business to a great extent. Stocks are light, while collections are fair. Indications for business for the first six months of 1904 are poor. People are not as prosperous as usual, as labor is not employed more than half to three-quarters of the time. The financial condition of farmers is fair, but there are no prospects for building or new enterprises being started. Labor agitation and the complete dominance of capital by organized labor will and has already

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stopped important building operations. Our largest builders of cotton machinery are working with less help only on part time. Cotton mills have reduced wages.

Trade with us has, for the year, amounted to a little more than for 1902; but, owing to strikes during the early part of the year and the continued high prices of merchandise, we have had to make up the business mostly in small sales, such as are made for repair work. Trade in agricultural line has been good. Plumbing and tinsmithing, except in a jobbing way, has been very poor. The heating business this fall has been fair. We have for the past 60 days or more bought lightly and only what we were actually obliged to, to keep up the assortment. Collections until November 1 were good, since then very poor. The people generally are in fully as prosperous a condition as they have been for the past ten years, though at this time most of the manufacturing concerns are running on short time. The farmers, with few exceptions, in this territory have had the most prosperous year since 1892-3. While there is but little talk and next to no figuring for new building for 1904, it seems to us that if labor unions will keep still there should be a good deal done in that line. There was considerable figuring done in the spring of this year and contracts drawn up, but when strikes were on and prices went up contracts were canceled. A number of these same parties say they will build just as soon as they are satisfied it can be done without an unreasonable cost.

From Hardware Merchants in CONNECTICUT:

The demand, as compared with other years, has been about the same, except in Builders' Hardware. Strikes and high prices in the building trades have stopped building operations. We believe stocks are light. Collections are fair. The people as a rule are prosperous. Labor has been well employed, but within the past 60 days some of the manufacturers have laid off a considerable number of men. Farmers are in good financial condition. New enterprises are not visible.

The first half of the year compares favorably with the past four years; the last half showed a marked falling off. Stagnation in building, labor troubles, a lack of confidence in the stability of prices and a general feeling of uncertainty as to the attitude of labor are the principal factors that have affected and reduced the volume of business. Stocks are about normal and collections fair. Regarding prospects for first half of 1904, much will depend upon the ability of the iron and steel industries to maintain a stability in prices. If this is possible it will go far to restore the confidence of buyers and stimulate business. People are generally prosperous, in spite of the fact that many of our industries are running on short time. The financial condition of the farmers is good, there being a ready market for all of their products. The prospect for building in our section is not promising. The high cost of labor and the unwise policy of labor unions have made capital timid, and as a natural result building has not only been generally curtailed, but has come to a dead standstill, with nothing in sight for the coming spring. This condition of affairs is bound to continue as long as organized labor fails to recognize the sanctity of a contract and renders it unsafe and unprofitable for men with money to invest it in building enterprises.

About the same demand has characterized 1903 as other years. Tobacco crops not first class. Very little private building. The prosperity of factory people good: farmers not as good. All labor appears to be employed. Am not aware of much building in prospect.

Demand for goods has been very good up to within a month, when it began to show a decline. Labor troubles have been the special influence affecting the general business in this section. Stocks have been fairly well kept up. Collections are poor. Prosperity is on the decline. About two-thirds the regular force of labor is employed in this section. Financial condition of farmers is very bad, their crops of last year having been almost an entire failure. The building prospect for the coming year in this section is not very promising, although there is some business in sight which, if not destroyed by the labor troubles, will probably materialize.

The volume of business has been less than for 1902, and labor troubles are the principal cause. Stocks here are full. Collections have been poor the last three months. People are fairly prosperous, but they feel uncertain of the future. About three-quarters of the laboring class is employed. Farmers' financial condition is excellent, and they are obtaining high prices. Prospects for building and new enterprises are poor. We look for lighter business in 1904 than in the present year.

Demand for goods has been very nearly equal to 1902. The general condition of the large financial interests of the country, labor troubles, &c., have affected business. Stocks of goods are not heavy. Collections are fairly good. As a rule people are prosperous. Labor has been fully employed up to within a few months. There is now a tendency to discharge a portion of unskilled labor and to shorten the hours of the others. The financial condition of farmers is evidently good. Building prospects are not bright for spring of 1904. The future is hard to predict. Many people talk of hard times, while others are confident that 1904 will prove better than the average Presidential year. The short supply of manufactured goods is a good indication that values will not depreciate for some time at least, and that labor will be fairly employed.

MIDDLE STATES.

New York, Delaware,
New Jersey, Maryland,
Pennsylvania, District of Columbia.

From Hardware Merchants in NEW YORK:

With the exception of the closing three months, the demand for 1903 has been far in excess of any previous year. Buying has been very lively and collections excellent. The last three months referred to there has been a general decline in the volume of business done. Payment on account has dropped off in a greater propertion. I think the only hopeful aspect that there is for the season of 1904 is a degree of faith entertained by people generally. Labor at present is employed in the proportion of about 75 per cent. of 12 months ago. The financial condition of the farmers is excellent, and they are buying liberally. Building and new enterprises seem to be at a standstill.

Demand for goods for last season has been about as in former years; while there has been no rush, there has been a steady demand, indicating that people receive about the usual amount and are only buying actual necessities. Trade at times, more especially toward winter, seemed to drop off from the country, and I believe because trade was looking to catalogue houses for supplies, some few instances of which I know. This is the greatest curse to the retail Hardware trade. Stocks I imagine in general to be light, as most of the trade is looking for lower prices. Collections fair, but not as good as in some former years. Farmers generally in this section were in hard luck the last season, consequently feeling very poor, and only buying as necessity demands. Labor employed only as present necessity compels. There is no especial demand for labor. Large factories are running only on half time, and some have shut down, especially the collar factories. The advance in cotton being so great and demand falling off has compelled some to retrench. Building is almost at a standstill.

The advanced cost of material and high price of labor has almost completely shut off building, except some repairing and possibly some extensions to old buildings.

Our general business has been good, even better than in preceding years. Seasonable goods, such as Refrigerators, Oil Stoves, Screens and Mowers, moved slowly; consequently we carry over more than usual in those lines. Our stock is rather heavy, notwithstanding the tendency is toward lower prices. Collections are always poor this month. The prosperity of our people is affected at present by our largest mills running very light, probably caused by the uncertainty of the market. A good many men have been discharged right in the face of a long, hard winter. All products from the farm command good prices, so farmers should be satisfied. Prospect for building poor on account of high prices and unions.

The demand for Hardware has been equal to former years in most lines, except building, which has not been up to the past few years. Farmers' trade has been better than in years; they have money and spend it. Stocks are generally light, as they always are on a falling market. Collection about as usual. Locally we expect more than our usual trade in building material during 1904, hence labor will be employed. Our farmers made big money from apples and potatoes and are buying liberally, and we can expect some building in the county next year. The labor question has frightened many from building and many from even repair work, as every little job costs double the old price.

The demand is below the average for the past four or five years. A strike and general suspension of one principal industry, Stove manufacturing, covering a period of two to three months in the early part of the year, together with the high prices of labor and lumber checking building operations materially have been largely the cause of decrease. The depression in the iron and steel business generally and the scare given the country by the industrial "fakirs" of Wall street have made the retail trade somewhat conservative. We have pursued the hand to mouth policy for several months past, so that we are now carrying a much lighter stock than usual. Collections have been fairly good, perhaps more from the fact that we have been discriminate in making accounts. The people here are not usually prosperous, for reason given above, also loss of employment through strikes and lockout. Labor is now well employed, at least temporarily, being stimulated by the early and continued cold weather, which is of great advantage to our local industry and indicates a good business for 1904. The farmers are generally in good financial condition, there being a good demand for all their products at good prices. Prospects for new buildings and new enterprises are not yet especially encouraging. However, it is yet somewhat early to make an intelligent prediction.

Our business for 1903 has been very good compared with other years. Farmers have made money. Stocks are heavy and collections good. All who will work are employed at good wages, and people are consequently prosperous. The financial condition of the farming community was never better.

Our business for 1903 is somewhat larger than in 1902, which exceeded our average of former years because our manufacturers were busy and running full hands at increased wages, and farm products brought a good price; and, with good yield, the farmers had money to repair their buildings and to buy other merchandise needed. Stocks are lights; collections fair. At present the people are generally prosperous. Our manufacturers are all running, but not all with full force, leaving some idle. The farmers are in splendid financial condition. Prospect for building next year is hard to determine at present. My opinion is that there will be much less than 1902 and 1903, owing to a general conservatism and a desire to go cautiously.

From Hardware Merchants in NEW JERSEY:

This has been our banner year. Our manufacturing industries have had all the orders they could fill and have been making overtime. This has helped us to some extent. Our former customers are getting out of the old rut, and are not trying to compete with the West, but are turning their attention more to the dairy, poultry, stock, &c. Our stock is about the same as last year at this time. Collections rather slow, but very few goods are being charged; almost every one pays cash for what he buys. Our people never had more ready cash. It is almost impossible to get help of any kind; our mechanics are all busy. All our thrifty farmers have money in the banks. The prospect for new buildings has never been brighter; we are short of houses. One of our factories will double its capacity in the spring, giving employment to over 100 men. Taking it all in all, we have a great deal to be thankful for.

Trade demand has been only fair for promiscuous goods by the general public. Factory demand has been general, but very economical. Labor influence has been an evil factor, and has affected local interests and the general merchant trade in particular. Our stocks are full and heavy; we generally load up when trade is dull and prices low. Our factory and mill collections are good. We allow them their own time and payments are satisfactory. Indications for business for the first six months are not encouraging, and will be cautious. The general class of people here are rather saving than spending. They are building or investing, as our saving institutions show. Labor is fairly employed on the short hour system, but manufacturers and builders are not benefited thereby. Condition of farmers in this location is fair to good; they do not look for credit or ask it, as in former years. Building prospects are not encouraging and no new enterprises in sight at this writing.

The demand for goods, compared with other years, has been only moderate. Stagnation in real estate and the stock market has been bad for business. Stocks are light and collections poor. People are only moderately prosperous, as only a portion of labor is employed. The prospects for building and new enterprises are not very encouraging.

Trade has been good and ahead of any year of our 28 years' experience. Factories are all busy and strikes do not affect us here. People are turning from stocks to real estate and are building. We are looking for lower prices, therefore are carrying as light a stock as business will permit. Collections slow; cannot explain the cause, except that the average man took his spare bank account and invested in stocks; they dropped 40 per cent., so that a whole lot of them are hard up. Quite a number of laborers have been laid off by the railroads, but labor generally is as near fully employed as ever. Although prices are high there will be a good deal of building next year.

The spring trade for 1903 opened up very good in the Paint line and Builders' Hardware. But the summer trade was very poor compared with the previous years, as the sale of Oil and Gasoline Stoves, Ovens, Screen Doors, Window and Fly Screens, Refrigerators, Water Coolers, Poultry Netting and the like was exceptionally poor. We bought very heavily on all those lines, figuring on our last year's output, so that our stock at the present time is much heavier compared to other years, as we carried many goods over. The sale of general Hardware has dropped off considerably this fall. But the demand for Stoves and Ranges has been exceptionally good. Our collections for this year have been better than previous years, as this part of the business had special attention. We find it pays to give more attention to the collecting of bills. From present indications I think the business

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for 1904 will be good. Am inclined to think that the financial condition of the farmers is very poor.

The demand for goods in our line has been fully up to the mark, although some kinds of goods have moved slowly because of the comparative inactivity in the building trades. I think stocks, upon the whole, are no heavier than they were last year, perhaps lighter. We are having very little trouble with collections. The farmers have not much this year. The extraordinarily wet weather made it impossible for crops to mature, consequently very few farmers have prospered financially. As far as I can judge, labor is employed in this section about as well as in former years. As to the prospect of new buildings, there is no likelihood of a boom in this direction; building material is high, and I think there is a general feeling of uncertainty as to labor conditions and cost of goods generally for the year 1904. In conversing with other merchants, I discover that in many instances their business has not been up to the average during the year, which, I suppose, is to be traced largely to the fact that the farming community, upon which we largely depend for a profitable business, has not been very prosperous.

From Hardware Merchants in PENNSYLVANIA:

Throughout the entire year 1903 our business has shown increased demand. The business during the fall months was especially heavy, although December shows quite a falling off, but that is due largely to the season of the year. It shows larger returns, however, than December one year ago. This is owing possibly to our increasing business rather than to improved conditions. The coal business in the bituminous regions is not so good this fall as the business enjoyed by the operators a year ago. The outlook for the first six months of 1904 is not as encouraging as it was for the first six months of 1903. There seems to be a slight falling off, and not the disposition to place future orders that was noticeable a year ago. Labor is still fully employed; but in some instances at reduced wages. The farmers are enjoying the results of good crops and liberal prices. There is not the amount of new work in contemplation there was a year ago. The feeling, on the whole, however, is optimistic, and we will be disappointed if the volume of business should fall very much below that of 1903.

Sales have been larger than for previous years, although we have not been entirely free from labor troubles. Stocks are light and collections are only fair. Mechanics are not as prosperous as a year ago, fully 40 per cent. being idle. Think the financial condition of farmers is good. Good prospects for building, but the labor troubles continue, and some say will continue until May, 1904. We look for a very dull business after the holidays. But if labor agitators would take a vacation and let the workmen themselves settle matters, this feature would right itself. Our local labor troubles have taken on the sympathetic strike, and this is now our trouble.

Business is the largest that it ever has been. Collections are fair, the slowness being due largely to nerveless way business has been carried on last few years. Farmers are in good shape, although our steel plants are not feeling at all encouraged by the present outlook. Building operations, in consequence, are not promising.

The first half of 1903 just as good as previous years. There have been strikes, and many of them. Our stock is large, and we are buying freely of spring goods, expecting a good spring trade. Collections of bills past due are impossible; we get nothing but promises. The present quarterly bills are being paid promptly. Cannot say much in regard to the prosperity of the general public. It seems as if the people at large have tightened the strings of their purses, as well as the manufacturers. No prospects of new buildings at present. All waiting to see what spring will bring forth. Our wholesale business with the contractors and manufacturers for the past six months has fallen off fully 50 per cent. Our cash sales for the general wants of the people equal last year, but in Mechanics' Tools there is a great falling off.

Demand not as good as for the past three years, caused by the local stoppage of Window Glass factories. Stocks are light and collections slow. The people are prosperous, as the Glass works are now running and labor all employed. There will be more building in our town during 1904 than in 1903.

Business is fully up to the last five years. High price of Oil has a good effect upon general trade. Stocks of goods are not heavy; collections are good. Labor is well employed. Farmers well to do, as they are getting good prices for their products. We look confidently for as good a business as in 1903. Prospect for building is good. The crops of the country are large. The output of the mines is the same, and all this product must be hauled, and the railroads will continue to wear out their equipment. It should be remembered that the prosperity of our country is not dependent upon the dictum of Broad and Wall streets.

The demand for goods is about the same as for former years. Labor troubles have affected the sale of Builders' Hardware, and the difficulty in getting orders filled promptly by manufacturers and delayed shipments due to inefficient railroad service have had an unfavorable influence on business. Stocks are light, and collections are fairly good. Our people are prosperous, and the farmers have had good crops and are feeling well satisfied. Labor is pretty well employed, very few are idle. Not much in prospect in building or in new enterprises for the coming year.

From Hardware Merchants in DELAWARE:

Demand has been normal. Short crops, to the extent of one-half in many kinds, have restricted sales. Stocks, for the most part, are heavy. Collections not so good, owing to reduced income from limited and inferior products. People are generally prosperous. Labor employed to extent of local supply. Farmers are in fair financial condition. Prospect for building is good, but no new enterprises in sight.

Demand has been better this year than in 1902 up to October. Loss of peach crop affected fall trade to some extent. Stocks are about as usual. Collections not so good as last season at this time of the year, owing to shortage of peach crop. Had a good paying small fruit crop. Farmers are generally prosperous. Labor is scarce, all employed. Financial condition of farmers good. The outlook for spring is good at this writing. The labor question is one that gives the most trouble. Many more men could get employment on farms. Many farmers have to put in less acreage on account of scarcity of help.

The demand has not been as good as during 1902. High prices of goods and poor crops have affected business. Stocks are fully up to our average. Collections are good, although the farming interest have been hard pressed financially during the year. Fruit crop was a failure, as also was the wheat crop. Indications for first six months are that business will be slow. This will be so until farmers begin to market their 1904 crops, such as berries, vegetables, &c. The people are in fairly good shape, not much owing by the farmers. They have kept close in their expenditures. Not much new building in prospect. If spring opens favorably and nothing intervenes to injure fruit, we think there will be good business throughout this peninsula after the early part of June.

The first few months of this year opened with increased business over 1902, but since August there has

been a falling off of 20 per cent., caused by local troubles, which include a short pea crop, short wheat crop, poor price for tomatoes and a very small crop of peaches. The corn crop is very good, but with prospect of low prices. December is raising our average, and will probably bring it up to 1902. Collections have, in consequence, been very poor. Our stocks are large for the season. The energetic ones in the farming community are prospering, but many are discouraged now, as help is very scarce. Farm owners are leasing and renting their farms in consequence of scarcity of help, and renters are leaving and going to the city, and our remaining colored help is very much demoralized. This has been going on for some time. Now we are realizing it, as we are getting near the "bottom of barrel." We have no special building boom in prospect.

From Hardware Merchants in MARYLAND:

The demand has been as good as in 1902. Both were banner years in business. The declining prices make purchasers timid in buying, and the early severe cold weather has put a stop to sale of building material, and outdoor work generally; also the decline in price of canned goods, which is now below the cost of manufacturing, and the decline in price of lumber. There are about average stocks of goods. Collections will average good for the year. The prospect is for good business for at least the first six months of 1904. There is considerable unfinished work to be completed that will extend to the middle of the year. Plenty of work, and labor is employed when the weather will permit. The demand for labor has been greater than the supply. Our farmers are in better financial condition and happier than I ever knew them to be before. There are quite a number of unfinished buildings and several large contemplated enterprises that are to be completed in 1904. If the depressed prices for canned goods and lumber continue I fear there will be quite a falling off of business, and a stringency of money in this section for the latter part of 1904.

The demand for goods this year has been good. Quite a number of jobs planned the year before were carried forward this year, but it is plainly in sight that a drawing in of the lines is taking place. Stocks as a rule are light, influenced largely by the belief that there must inevitably be a depression in iron and its products and the accompanying decline in manufactured goods. From our own point of view this very fact may tend to ward off what is expected. Our people are in fairly good financial condition, and collections are up to the average. Owing to open winter, labor has been almost continually employed. Some new buildings are being planned, but not to the extent of last year.

From Hardware Merchants in DISTRICT OF COLUMBIA:

The year now about to close has been the greatest, in regard to sales, of any during our 30 years' experience. This was brought about by the prosperity that has been so general. Stocks, especially of the retailers, we believe, are normal. It seems to be the judgment of many that a good fat business cannot be done with a stock that is too much starved. Collections are very good. Much, indeed very much, depends upon the farming class, and since crops have been abundant and prices good, we have been enjoying a degree of prosperity with which we cannot reasonably hope to be always blessed. Labor is in great demand and employment is easily found. The outlook for next year's business is good, but we shall not be surprised if there is some falling off. In the building line, we regret to say, things look rather blue. The arbitrary and unreasonable demands of the labor unions have taught a bitter lesson to those who have had to do with them this year, and will make every one hesitate before he engages in building operations in the near future.

CENTRAL STATES.

Ohio. Illinois,
Indiana, Michigan,
Wisconsin.

From Hardware Merchants in OHIO:

The demand during the last six months of the year has shown an increase over first half of 1903. Stocks are well assorted without any speculative features. Collections about normal. Labor is unusually well employed. If financial prosperity will make people happy the farmers ought to be thankful and contented, as their condition has been gradually improving during the past two or three years.

Sales for 1903 have been 15 per cent. greater than during the previous year with no larger stock of goods. The demand and increase have been continuous during the entire year. Men have been regularly employed and have had good wages. Present stock of goods is lighter than usual, as our plan is to buy light and turn stock quickly. It is the most profitable way in any retail business. We sell a great many goods on credit and have had comparatively no losses. People are prosperous, crops fair, and all bring satisfactory prices. The general financial condition of the average farmer, and citizen as well, seems to be good. The speculative or stock movements have not apparently effected the people who do the greater part of the buying in the average store. A good amount of house building has been carried on during the past year, but larger buildings for business, &c., have been lacking. Prospect for trade for the spring looks encouraging, and we are planning for fully as good a trade as usual. In fact, we see nothing to cause us to be alarmed in the least about the future in the retail business.

Business during 1903 has proven very satisfactory in volume and shows a healthy increase over any corresponding period in our history. Outside of Wall Street troubles and rumors there has been nothing to unfavorably influence a healthy demand, but the unsettled market in many lines during the late fall has caused a falling off during the present month. Collections, which were good up to and including the early fall, are only fair at present. The people, as a rule, are prosperous, but the shops in this territory have laid off a comparatively small number of men, and this has had a tendency to tighten all purse strings, a condition that will undoubtedly continue until spring trade opens. Farmers were never in better shape, but inclined to be conservative in their expenditures.

Demand was not as good as last year, owing largely to the price of materials, lumber especially, and the wages asked by labor. While wages have been very high in cities, and work has gone on notwithstanding, the necessities of those contemplating building, and the prospect of getting sufficient income from their ventures have not been flattering enough to justify the outlay, and so improvements have been put off that otherwise would have been begun and completed this past year in the country towns. Stocks are, we think, a little lighter than they were last year at this time. There is an undefinable fear that there is to be a drop in prices and merchants are hedging as much as possible. With the guarantee that some manufacturers are putting on their goods in regard to prices that feeling of depression must pass away and confidence in the future in regard to prices be again established. There has been a much larger per centum of cash transactions during this year than in any previous year, and collections are much better. Crops have been good this year, and even where the farmers have not rented for gas drilling there seems to be a decided good feeling over the results of the year's work. Labor has been employed to the fullest extent until very lately. Our factories have not such an abundance of orders as they had last year, and are therefore letting those of their workmen go who have not shown that they were neces-

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sary to the manufacturer in building up and keeping his trade. There are already some inquiries as to prices for the coming year, and if labor is reasonable and prices of material do not soar there will be work for the next year. The farmers in our section were never in better financial condition. The experiences they have had have taught them to take care of their money, and we do not look for anything like extravagance on their part. We look for a steady business without any booms or inflation the coming year.

The demand for goods has been better with us than in previous years. There have been quite a number of buildings and residences erected here this summer, and we have had no strikes. Our sales are 15 per cent. over 1902, which was an excellent year with us. Collections are good. The people in this community are prosperous; labor is fully employed. Farmers in this county are in good financial shape. Prospects for building for the next six months are very good; do not know of any new enterprises to be started here just now. We look for a fair trade during 1904, but not quite as good as 1903.

From Hardware Merchants in INDIANA:

The demand for goods as compared with 1902 shows a marked increase, with the exception of the month of December, which shows but a slight increase. This is explained by the decline in the metal market, affecting the manufacturing establishments and causing them to be less liberal in purchasing for fear of further declines. This condition has improved somewhat, however, the past two weeks, and the willingness on the part of mills to guarantee prices for 1904 has stimulated purchasing. Dealers are generally well stocked on all lines. Consumers generally have not yet stocked in supplies. Collections are equally as good as 1902, and, while there are some exceptions, they will compare favorably with last year. People generally are prosperous, but are not making as much money as they did in 1902. There is much closer competition, and profits are necessarily smaller in all lines of business. Labor is not as fully employed as in 1902, and yet up to the present time wages have not been reduced in this locality. The farmers are in a good financial condition, and are liberal in expenditures for farm improvements in fencing, buildings and machinery. In fact, this is the most hopeful outlook which we have for 1904. We expect to do the largest business with farmers this year that we have ever experienced. The prospect for building in this immediate locality is exceptionally good. This town, no doubt, will put up a half million dollars' worth of new buildings the coming year, and is expecting to enlist several new enterprises in the manufacturing line. The decline in stocks, in the East especially and over the country in general, has not materially affected business in this locality, and, in fact, it did not seem to have any effect upon business nor upon money lenders, excepting that they ask for a slight increase in interest. Money seems to be just as plentiful. People are willing to embark in new enterprises, and are only particular to know that the same are on a safe basis. On the whole, we have a very hopeful outlook for business for 1904.

Demand has been better than for the past few years. Special influences affecting trade are large corn and wheat crops of 1902 and extremely high prices of hogs. Stocks are normal and collections good. The people are prosperous and labor is well employed. The financial condition of farmers is excellent, and indications are good for new enterprises, &c., in the spring.

Owing to favorable circumstances our trade has been equal to any in our history; however, the general trade has not been so good, owing to labor troubles and short crops. We are carrying as heavy stock as usual at this season of the year, but expect to buy very conservatively until conditions are more settled. Collections are slow, due, we think, mainly to short wheat and oat crops, a late corn crop and the low price of stock. Labor is not as generally employed as a year ago, and laboring classes not nearly as prosperous. Land owners are prosperous, but renters are for the most part hard run. The outlook in the building line is not very favorable, owing to the trades unions and the contractors having been in a fight all the past year, with no immediate signs of a settlement. Our city has had new railroad shops located this year, and as soon as spring weather will permit several buildings will be begun. Two new traction lines have come to us, and in all our city has, considering conditions, been very prosperous. We have plenty of capital waiting to be invested, but it is likely to continue shy until capital and labor get together.

We have had an increase in trade of about 16 2-3 per cent., caused largely through the influx of new factories locating here. We have very cheap coal and through the gas belt district the gas is giving out, causing the factories to look for localities where cheap fuel and good shipping facilities are to be had. With four railroad lines, we have at our command all the essentials to make our's a good factory city. We are reducing our stock, but do this every year at this season before inventory. Collections have been very fair. Through the influx of new factories we expect a good business for the first six months of 1904. Labor was fully employed until within the last 30 days, labor troubles causing one of our best factories to shut down. The large amount of building caused a great scarcity of labor. Farmers are in good shape, but the present corn crop was not up to the average; and hogs being much lower in price as well as corn, we expect the farmers to retrench on purchases. We expect a very busy building year in 1904. New car shops to be built here, as well as other factories, will call for numberless residences. There is a big demand for houses, and they are very scarce.

The demand has been better than in previous years, owing to cheap coal and transportation facilities. Stocks are not heavy, but are well assorted. Collections are fairly good. The prosperity of the people is generally fair. Indoor labor is fully employed, but those who work out of doors have not as much work as at other seasons. The financial condition of farmers is good, and collections are up to the average. Competition is keen and profits are small. Business has taken on more of a country store style, not so well classified as formerly, but more of a general variety.

Our business this year has been in excess of any previous year, owing largely to the fact that we have had abundant crops, which command good prices, and that our manufacturers have been busy all the time, laborers being well employed. Owing to the general tendency of a decline in values, I think stocks are not large. Collections are good. The prospects for building next year are uncertain, because many people believe that values will be lowered in building materials, and that by waiting for one or two years there will be a saving of 20 to 25 per cent. in the cost. There are two facts which enter into the present situation, which I believe interfere with new enterprises. One is that next year there will be a Presidential election, which always causes business to contract. Another condition is the apparent unrest of the laborers. Just to what extent this will affect us is hard for any one to tell. We feel like being conservative.

From Hardware Merchants in ILLINOIS:

The year has been throughout a most satisfactory business year. Demand for goods has been large. Locally there has been a considerable amount of factory and residence building. Crops have been good, and the farmer has realized well. Stocks are neither heavy nor light. While the buying has decreased during the past month, we are looking for a material increase in this connection, beginning with January 1. Throughout the year collections have been satisfactory and money plentiful. While there has been current a certain feeling

of unrest, it seems to us that this condition is in a measure due to newspaper suggestions and to a great extent to the unstable stock markets of the East, and labor troubles in general throughout the country. The people at large seem to be enjoying a season of general prosperity, which, while probably not as great as that a year ago, seems more satisfactory and natural. Labor has been well employed, at good wages. The farmer is in excellent condition financially. There is considerable talk of building and of the starting of new enterprises during 1904. Our city is a manufacturing center, yet we have suffered no labor troubles, for labor is not strongly unionized. Because there has been no agitation labor has been fully employed, at good wages; in fact, there has been a shortage of help. Our manufacturers seem to feel that the ensuing year has a bright outlook.

The demand for Hardware has been about the same as 1902, but Stoves have not sold as freely. The higher prices of living have affected the middle classes especially—by which I mean those working on salaries, those not in the trades unions, whose wages have not been increased. Stocks are rather light, as most people believe that prices have reached their highest point and that there must be a change toward a lower level. Collections are not very good. The people are in a good financial condition, except as above noted. Labor is now well employed, but all employers are resisting any further demands of labor for advances and are fighting for some reduction. The farmer—Gee whiz! He is the whole thing. He has good crops, high prices, and gets cash for all he sells. Still he is unhappy, because he has to pay 3 cents a bushel for having corn husked. The prospect for building is fairly good. The contractors are all busy, working all winter.

The demand has been about the same as in 1901-1902. Stocks are heavy and collections good. The people are very prosperous, labor well employed and the farmers financially never better off. Nothing in sight yet for 1904, but we expect a fair amount of new work. We have not had any boom times, and town has not grown in 14 years, but has steadily improved, and we do not expect to be affected by reactions elsewhere.

Every month in this year has been a record breaker in our business, with a slight falling off in proportion of increase in the past month. We have a large stock of goods, and believe other merchants are also increasing their lines. Collections are good. The past three or four years have been prosperous ones for our farmers who have had good crops for which they received good prices. The weather this fall was unusually fine, permitting a great deal of outside work, making a very heavy demand for labor at good prices. Our mills and factories, as a rule, are busy, and report good demand for their product. The demand for coal keeps our miners busy, distributing a large amount of money in this county. Bank clearings for November were quite a little larger than last year. While many of our business men are very confident that the first six months, at least, of next year will be very good, others are inclined to believe it is time to be conservative. So far as we can see, there seems no reason why our business should fall off to any great extent.

Demand has been nearly up to 1902. Strike troubles last spring injured building trade. Low prices on cattle and hogs will affect trade this winter and spring somewhat. Collections fully equal 1902. Our laborers have had steady employment at big wages and should be flush. Farmers are in good condition. Lower prices on material and labor will increase building next season. Uncertainty in regard to prices for next season is holding back some orders.

Trade runs same as 1902, which was best we ever had. Labor trouble and a general feeling of uneasiness among mechanics have affected business. Stocks are light and collections are fairly good. We don't see much building prospect in sight yet for next year. About two-thirds of the labor is now employed. Farmers were never in a better financial condition than now. With large crops and large prices the farmers all feel rich; nothing is too good for them to buy. People are prosperous in general, but mechanics are not spending as freely as last year, owing to unsettled feeling regarding steady work. They all have a feeling that factories are liable to run very unsteadily, and are hedging accordingly.

Our trade here has shown a marked increase, and we have had trouble in getting goods, the inability of the railroads to handle the increased volume of business having been a serious handicap to the dealer. The unusual delays of this kind and scarcity at times in certain lines have been the marked features of the 1903 business. Our stock is heavy in most departments, and volume of business continues good right to the end of the year. There seems to be plenty of money here, and collections are just as good as we make them—we mean that where we force or insist we have no trouble to collect—and this has been the case during entire year. The crops have been universally good here and labor steadily employed, consequently times are prosperous and money easy. We have better prospects in a building way for the coming year than at any time during the past ten years.

Our trade for 1903 has been larger than in any year since we began business. Our stock is very large. Collections have been good. People are all very prosperous. Labor is well employed, and it is hard to find help of any kind Farmers have good crops, and are getting good prices for them. Prospect for building is not very good. Four interurban electric roads are being built at the present time out of this city, and several more are in contemplation.

From Hardware Merchants in MICHIGAN:

The volume of our business is larger than in any previous year. There is an unusual amount of building. Stock larger than we wanted it, but have been compelled to keep up stock to hold our business. Collections are good as usual. This county was never more prosperous, shown by large deposits in banks. Labor is scarce with farmers; all men can get work that want it. Farmers are out of debt, and are making money. Crops so large that they have not been able to get work done before winter set in. Building prospects are good, many buildings going up now, which is unusual here in the winter. It will take years to get where we were during the last period of depression. There is a disposition for all to slow down and be cautious until we are sure of the future, as there seems to be a feeling that we must have a period of depression until after election. However, we must have a profitable business for another year in this section unless outside influences prevent it.

The demand for goods about the same as in recent years. Greater effort on our part has effected our business. Our stock is heavier than usual, and we find collections good. The people generally are enjoying a fair amount of prosperity, and the average number are employed. The farmers are in good financial condition, with encouraging prospects for building and new enterprises.

The largest business we ever did was in 1903. Business has been favorably influenced by employment for all who were at all competent at good salaries and confidence as to the continuance of these conditions. We keep our stock "full up." Collections have been good. There is no doubt as to the prosperity of the people in 1903. We see no reason for conditions changing in first half of 1904. Labor has been scarce. We believe that now the supply is equal to the demand. It may exceed it before the year is out. Farmers, so far as we know, are in fine shape. Building enterprises show no signs of a slump. Labor has tended toward conservatism here. The prevention of sudden slumps in prices gives merchants confidence in purchasing, and we do not expect to cut down our orders for the spring of 1904.

Trade has been as good as in previous years, except last year, which was ahead of any year's business we ever had. There was not as much house building among farmers

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as usual, but more good barns were put up than ever. Stocks are lighter, and collections not as good, owing to recent decline in prices of farm products, which is causing them to hold off for better prices. Working people are well employed, and it has been difficult for farmers to get help to care for their crops. Farm wages have been high. We see no reason why there should not be the average trade next year.

The demand with us during the past year has been larger than former years, although it has not been quite as evenly divided as in some years. The farmers have received good prices for what they have had to sell. The hay crop has been extra heavy. Prices on live stock, while good, not as high as last year. The heavy rains diminished the yield in beans and potatoes. The severe drop in the price of securities and the increased rate for money have tended to make business men more conservative. Our stock is somewhat broken and lower than a year ago, owing to an increase in the volume of business, especially during the past three months. Collections have been excellent; those that are in the habit of paying their bills have been discharging their obligations promptly. We believe that the average dealer in this section has less accounts on his books that in former years, owing to the fact that the farmers have more money to pay with. The prosperity of the people is evident on every hand, the farmers have been able to rebuild or build new houses and barns and make general improvements on the farm, besides purchasing for the comfort and convenience of the home. Labor is fully employed; in fact, the demand has exceeded the supply. Any person who is disposed to work could find ready employment at good wages. The financial condition of the farmers we believe to be good, not alone as a result of this year's resources, but of several years, with fair crops and good prices. The prospect for building and new enterprises is fairly good for 1904. Business men, we think, are pursuing a conservative course in purchasing new goods, realizing that prices on Stoves and many articles of Hardware will naturally fall after the advancing prices for the past three years. The tight money market at certain points has not been felt much locally yet. We count on fair business results for 1904. The talk of less business during the Presidential year has become a habit to some people. We have seldom, if ever before, confronted a new year with the condition of business in such excellent shape.

We have had a very satisfactory year, our sales running about the same as last. We are not making any purcases, except as we are compelled to, so our stock is now low. We find collections very good. The iron mines are laying off a great many men, but they are finding employment in the lumber woods and elsewhere. We are not looking for any great business depression, as the mines no doubt will be running full force again in the early spring. Labor generally is well employed with good wages. We are not looking for any great building boom, but expect a very good year in this line.

From Hardware Merchants in WISCONSIN:

Our business this year has been fully as good as last year, and would have been far ahead if we had been able to give it as close attention as last year; but on account of building and rearranging our stock we could not push sales as much as we would have liked to do. Our stock is the largest now we have ever carried, and I think this is nearly the general condition of stocks. The outlook for the next six months' business is good. Labor has been fully employed at good wages. Our mills and factories are running full time, and our farmers have had a prosperous year; in fact, are better off now than they have been in years. They are buying very freely, and what is best about it, they buy for cash, and buy better quality and higher priced goods than formerly.

We have sold more goods this year than for three years past. A wet and cold season made quite a difference in some lines. The high price of lumber retarded building somewhat. High prices of Stoves and cast goods generally cut a large figure. Stocks are generally light, and collections are fairly good. Labor is fairly well employed, but wages are slowly being reduced. Farmers are in as good shape as the United States Treasury—full of money. Catalogue houses seem to be gaining ground. There will not be much building, locally, for next year. Our paper mills, which are practically all we have, are running on shorter time, with reductions in prices and fewer orders.

Business in our locality the past year has been excellent. Crops and manufacturing enterprises have both flourished with us. Stock heavier than ever before, and believe we are not different from majority of Hardware houses. The better times make the demand more varied and extensive. Not only that, but the demand for the regular "always staple" goods has been larger. Profits in some lines have been pretty well cut—always will be. If it is not the grange store, department store or catalogue house, it will be something else. One feature of good times is always good collections. Indications for 1904 business are excellent. Farmers are prosperous. Our manufacturing industries prospering, though not extensive. Prospects were never better for a good season of building.

Demand has been better. Crops not as good as last year. But we have had several good years in succession, and the loss in crops was not felt. Stocks are about as usual. Collections fairly good. This is a great pea country, and the price has been off from what it was last year. In consequence a great many farmers have been holding back their pea crop. People are prosperous. Labor is scarce. Financial conditions are good. Prospects for a great many new buildings good. We will not buy too freely in consequence of the unsettled markets. For a time our policy will be to buy just as the goods are needed and in small quantities.

Business has been good the past year in these parts, as good as any year of the past three years, excepting a few manufacturers who say their sales last year have been smaller. Farmers especially have done well; good crops and fair prices have enabled them to buy liberally. Collections are good. Stocks of merchandise on hand are fair, perhaps a little smaller than last year, looking out for a decline in prices. There are no good reasons to expect business to be poorer next year, but we have a few people predicting and expecting it because poor years follow good ones. Labor is well employed and prospects for building good.

All lines except Builders' Hardware have been in good demand. We have had very few new buildings this year. Stocks are rather light, as there is no speculation in buying goods now. Collections are about the same. I think that general business will be good. Our people are all prosperous and have been well employed. With good crops and good prices, our farmers are highly prosperous. We expect more building in 1904 than we had in 1903. We think the general prosperity of 1904 depends largely on the satisfactory settlement of the labor problem.

NORTHWESTERN STATES.

Iowa, North Dakota,
Minnesota, South Dakota,
Nebraska, Wyoming,
Montana.

From Hardware Merchants in IOWA:

The demand for Hardware has been somewhat curtailed by the prevailing high prices; this is especially true with Builders' Hardware. Collections are fairly good; stocks medium. People are as prosperous as usual, and labor is quite well employed. The farmers have money. Not much building is going on in this section.

Demand not quite as good as last two years. Ours is an agricultural section. Poor corn crop and low prices on cattle and hogs. Stocks normal. Collections fair. People well to do, but money scarce. Labor has been quite well employed. Farmers are well off, but are buying 40-cent corn to feed $2.50 cattle, which makes them hard up, and, of course, it means a loss if prices do not improve. Do not look for much building.

Owing to the extremely wet season, which lasted most of the summer, crops in the northwestern part of Iowa were very short, with consequent light trade. Stocks carried by retailers are not heavy, the inclination being to order in small quantities. Collections are slow. Outlook for next year not very encouraging now. Laboring classes not as well employed as they were at this time last year. Farmers' crops being short, they have little upon which to realize cash. The prospect for building and new enterprises not flattering.

Demand has been about 15 per cent. less for 1903 in comparison with 1902; owing to labor troubles, strikes, and farmers who overbought largely of lands in the new boom counties. Stocks are very light. Have been buying sparingly, fearing a decline along the whole line of Hardware, particularly in the heavy goods. Collections are fair. Prosperity of the people good. Labor in the farming line has been good, and general labor fair. Mechanics not well employed, owing to strikes, &c. Farmers in Iowa are on top and in fine condition. Some have overbought in wild lands, but all will pull through. Building enterprises look dull and discouraging.. We are an agricultural country; our strength is on corn, oats, hay, hogs and cattle. In this particular part of the State we have a large crop, secured in fair condition for a wet season.

The demand during 1903 has been very much below the average. The first half of the year was very wet, the roads in the worst condition for years. Oat crop spoiled in blight, hay crop good, corn a half crop. Money is very close, on account of so much going in foreign lands. Stocks are light. Collections very slow. The people here are very prosperous. Labor is well employed, because of so much railroad extension. Financial condition of farmers is good. Prospects for building not good at all. In our judgment 1904 will be a very light business year here. On account of the unsettled condition of the market, we think the bulk of merchants are not anticipating their wants in advance as in former years.

Demand has been less than the average for other years. Two comparatively light crops in succession have been detrimental to business. Stocks are about up to the average. Collections are fairly good, considering crop conditions. The prospects for business for the first six months of 1904 are not flattering. In a general way the prophesies of the pessimist regarding the prosperity of the people have not been realized. There is plenty of work for willing hands. Mortgages on farms are being canceled, and some farmers have money in bank or out on loan. Building prospects are not encouraging before another crop.

From Hardware Merchants in MINNESOTA:

Demand about equal to 1902. Continued rise in wages and building material has affected business. Stocks are about the average. Collections are none too good. We do not think the people are any too prosperous. Labor is not as well employed as this time 1902. The farmer is in reasonably good condition in this locality. We look for no great amount of building during 1904. Anticipate a great falling off from 1903. We look to a return of more even times, with a possible bearing toward depression. Speculation in farm lands will affect and is affecting us in the same manner as watered stock is affecting the Eastern and Middle portion of our country. We fear that a settlement day may not be far off, with all its dreaded consequences.

A good, liberal trade, but hardly equal to 1902. A very late spring delayed both farming and building operations, and the same conditions have remained the entire year. This and an unusually wet season have resulted in postponing many projected improvements. Stocks are pretty full. Collections have been decidedly backward, but the farmers' bins are full and an unusually small portion of the crop has been brought to market. Good prices prevail for all farm products. The people are prosperous, and all hands employed. Prospects for the new year yet indefinite, but there are indications of a lull in our very rapid development of the past two years. A good deal of money has been withdrawn from our banks for investment in Western and Canadian land.

Demand not as good as past few years. Depreciation in Western farm lands affected some, and the general financial depression affected others. Our stock is about as usual at this time of year. Our business in 1903 ahead of 1902, but not so much so as we expected. Collections slow, on account of a wet fall. Prospects not as bright as might be. Land values much lower than a year ago. Not as many building indications, and labor is not now as well employed. Prosperity has had full sway here for the past few years, but the impression is that times will not be so good for the next few years.

General demand for goods was fully up to last year and prices better, except during late fall when excessive rains retarded work and destroyed part of grain crop. Stocks are lighter, and only such goods are bought as are for immediate use, in anticipation of lower prices. Collections are slow, for the reason that the crop was short and of poor quality. Cattle and hogs are very low in price, and farmers realize little. Labor does not find as ready employment nor as good wages as last year. Lumbermen are not employing as many men, and those hired get less wages. Financial conditions of farmers not bad, only they have not as much money to spend as in previous years. Prospect for building poor, and many will postpone building on account of excessive demands and arbitrary rules of labor unions. Anticipate a dull year and little money made in business.

Demand somewhat lighter than 1902. Too much rain has injured crops. Stocks are rather light, and collections below average. Prices of beef and pork are below cost of production, making farmers hard up. This will affect merchants depending on farmers' trade. When a farmer starts in to economize he practically stops buying everything. Not much prospect for building. A great deal depends on what the beef trust are willing to pay next spring.

I cannot see that there has been any material change in the business situation from 1902. The volume has been about equal, but collections have not been quite as good, owing largely, however, to the wet weather of the summer and early fall. Stocks, I think, are lighter than at this time a year ago. In this section of Minnesota I cannot see that the outlook is less bright than a year ago. Our crops have been fair, prices are good and labor is well employed at good wages. Barring unforeseen calamities, I feel that the first half, at least, of 1904 will be equal to the past few years.

The demand for Hardware has been somewhat less. The summer months were so excessively wet that farmers were not able to get onto their farms to do needed work, and although some farmers have done well, the majority have had little net outcome. Many of our customers have overspeculated in what they thought cheap lands, and, although we cannot say there is any severe tightening in money, all are inclined to go very cautiously. Stocks are light, and buying is very conservative. No great amount of prosperity, but almost no distress. Labor is fairly employed, and the condition of farmers, as a rule, is good. At present there seems to be every indication that the coming season will be a quiet one in the building trades, and there will be very little

The Outlook for Hardware

undertaken in new enterprises until after the general election.

We have not found the demand for Hardware the past year equal to the year 1902; probably we expected too much of the year. The greatest hindrance to a large volume of business in 1903 was the incessant rains, making it impossible for the farmers to sew their low lands, thereby reducing the acreage and giving the farmers that much less to spend this fall. Our stock is in a normal condition at the present time, and we believe that the dealer who pursues a conservative policy the coming season will be the best off. Collections are very slow; in fact, I believe that they are slower than they have been at any time since 1893. We do not look for any improvement before the farmers being to market their stock, that they are now fattening on the crops raised last summer. The extent of the prosperity that we are to enjoy the coming year will depend entirely upon the outlook in the spring. If it opens up a wet season, with all the earmarks of being a duplicate of this year, we will not look for a large volume of business and will buy accordingly; on the other hand, if the spring is a comparatively dry one, we will look for a large volume of business. Labor is well employed and will be the coming year, because of some local activity in the railroad line. Most of the farmers hereabouts expect the year 1903 to pay all the expenses of the family and farm and to leave a balance to be put away for old age, a rainy day, or to buy the oldest son a farm when he gets ready to settle down for life. If a year fails to do this it is counted a poor year, and the farmers will do without a great many things before they will tap that bank account; so that while in reality the farmers are in a very prosperous condition, it does the merchant no good if the year is not a good one.

As the year closes, and we are enabled to make comparisons in a more general way with preceding years, we find that 1903 has, in spite of many discouraging features, made at least an average showing. The first half of the past year was full of encouragement, and in each month in that period showed a substantial increase over corresponding months of previous years, and prospects very favorable for a good fall business. The fact that this has failed to materialize has probably been the most disappointing feature of the year's business and, much as any representative retailer may be adverse to assuming what might be considered a pessimistic attitude, still, in this locality, we feel justified in complaining of the results of the last six months. Our farmers harvested a good average crop but, since then, prices in all products have fallen off to such an extent that the financial condition of the average farmer is certainly not good. This has made collections unusually slow, has caused a considerable falling off in the demand for better grades of goods, leaving the stocks in these lines rather heavy; and has also been the cause of a very disappointing holiday trade. It is rather early yet to mention prospects for the coming year. If our farmers are enabled to hold their produce until they can obtain better prices than prevail at present, we believe our spring trade will be exceptionally good. Otherwise we do not expect much until another crop is in sight.

From Hardware Merchants in NEBRASKA:

Demand above the average till about December 1, when it fell suddenly to far below average. High prices of livestock and agricultural products have stimulated demand until recently, when the falling price of live stock was almost simultaneous with falling of in demand. Stocks are not heavy, and there is anxiety to reduce them to the lowest point possible with all possible haste. Collections are slow, very slow, considering conditions. The people's earnings have been very liberal, but they have been very largely absorbed by the enhanced price of about everything for which they expended money, leaving net earnings not better than a long average, indeed if they are that. Labor employed about as in 1902. Financial condition of farmers not greatly advanced over 1902. Prospects discouraging—decidedly.

Trade in staple Hardware about the average, seasonable goods, such as Screen Wire, Freezers, &c., poor. Big trade in Lawn Mowers. Collections a little slow. Steel Range trade nearly a blank; Heater trade very light. Plenty of money for necessities. Crops light, and low prices stop sale of luxuries and goods not absolutely needed. Farm and other labor fully employed. No present indication of much improvement beyond the normal. Farmers are looking for lower prices on merchandise, owing to coming Presidential election, &c.

The general trade in this section has been of the very best, especially during the last six months. One reason for this active trade has been on account of building going on everywhere in both the city and surrounding country. Better buildings, with modern conveniences, have been put up. The better goods are the ones that have been selling. The cause of this activity has been the good prices prevailing on farm products. The slight shortage in crops, we think, is cutting in on holiday trade, as well as lower prices on cattle and hogs. Stocks are being well kept up. Collections are fair. Prosperity still reigns, especially among the farmers, who are carrying good bank accounts. Prospect for building fairly good.

Demand has been for a better class of goods. Volume of business throughout this State 15 to 20 per cent. larger than last year. Good crops, good prices, no diseases among stock, general prosperity of the country, have affected business favorably. Stocks generally average equal to other years, some few reducing stock. Collections are not so good as last year. Money being invested and spent more freely. Tendency to incur obligations. There is an uncertain feeling among conservatives about 1904. The impressions left from last depression will have a tendency to hold in check any great financial scare in this section of the country. The people are in a prosperous condition. Labor so well employed the employee names his wage scale and hours for labor. New buildings and enterprises will be cautiously promoted. In conversation, and from correspondence, we learn of a cautious feeling existing among all classes. A good symptom surely; one that will prevent surprise and continue safe advance in improvements.

There seems to be very little difference in regard to the demand for goods over last year. Business was about the same. Stocks in this locality are rather heavy. Collections fair. People here seem to prosper, everybody busy, and no need of anybody being out of work. Farmers here are all well to do and, so far, the prospect for building is good.

Demand 25 per cent. greater than for 1903. Collections good. Stocks, as a rule, are light. Trade has suffered to some extent, due mainly to the fact that the weather has been favorable to the farmers. Financial conditions are better than ever, almost impossible to hire help by day or month. Crops are better than anticipated; farmers are out of debt, many with bank accounts. The outlook for building is very bright. Conditions are very favorable for a good future business.

From Hardware Merchants in NORTH DAKOTA:

The Hardware trade for 1903 has been very satisfactory. Collections have been above the average. The wheat crop was somewhat better than last year, and better prices have been realized, leaving our farmers with more money, which is an indication that they are in a prosperous condition, and that trade will be good for some time to come. Labor has been well employed at good prices.

General trade improved over 1902. Extra building. Stock in good condition. Best collections for years. Pros-

perity of the people first class. No idle men. Financial condition of the farmers best for years. Building good.

Referring only to our individual business, the demand for goods in our line this year has been better than in the preceding one, but taking the trade in general throughout the State, believe sales will fall short of 1902. Stocks, too, I am inclined to think, are larger than the average Hardware dealer would desire, caused by their anticipation of a good fall business that did not come on account of short crops, which have existed in most parts of the State. I believe the general complaint is that collections are not good. The people as a class are prosperous. Most of the inhabitants came here without anything, or with but little, and in the Red River Valley, where we are located, they are now provided with good homes and farm buildings. Mortgages that were contracted some years ago are being paid off very rapidly. One of the elements making collections slow in some localities in the State is occasioned by the farmers holding their grain. Then in other localities crops have been very poor and they have but little to sell. As to employment of labor, there has been a great scarcity, for several years, of good help required in all kinds of building construction, such as carpenters, bricklayers, sheet metal workers, painters, plumbers, &c., which fact, and their services being high, has retarded building considerably, but believe the labor proposition has not caused as much building to be sidetracked as high priced methods. With all that, in our city we will have more good buildings put up in 1904 than in 1903.

We cannot compare this with other years, as this is our first. However, the business has been fully up to our anticipations. Crops have been but fair, and prices of cattle good. Retailers advise that fall trade has not been up to expectations; consequently, stocks are larger than they should be. Collections have been fair. Taking our State as a whole, the farmers are in fair circumstances, and with each year they are better able to pay for their supplies in cash, but ideal conditions are still in the future. We do not look for the usual amount of building next year. However, the immigration in the spring will decide that.

The demand has exceeded that of the preceding year to a considerable degree, due to good prospects for crops, which were ultimately realized, together with fair prices for all manner of farm produce. Stocks are lighter than usual owing to a feeling that lower prices are imminent on account of trouble in corporation circles. Collections in the northeastern counties of this State have made a new "high water mark," debts of long standing as well as current obligations being paid This section of the State is prosperous beyond all antecedent. A larger acreage is plowed than any fall during the history of the State. A heavy snow fall, more being on the ground at this time than has fallen during the entire winter for many years, assures abundant moisture for starting the spring crops. Farmers are generally in good financial condition, and the next summer promises many new farm buildings. All in all, it can be said that this section of the Northwest is comfortable, and has a mighty "rosy" future before it.

From Hardware Merchants in SOUTH DAKOTA:

Hardware trade has been good during the year, and the volume of business has been greater than previous year. Activity in building and the good prices farmers have received for all their produce has affected business for the better. Stocks are kept well assorted, as trade up to now has been quite active. Collections have been good, but commence to show a falling off. The outlook for business is favorable. Town people, as well as farmers, seem to be prosperous. Labor has had full employment at good wages, and everybody seems to feel good, and would continue to do so if it were not for the stories which come from the East about the coming of hard times and the tightness of money. Our financial conditions are better than ever. Farmers are mostly well to do, and there is no reason why a financial crisis should affect us much, as long as we can raise crops and cattle. Locally, building prospects are good, as our town has had a steady growth. There is great demand for houses, and many houses could not be built on account of scarcity of labor. We expect a large building boom, unless everybody gets frightened.

Goods have been in smaller demand than in other years, due to a wet season. Stocks are rather light. Collections are much better than the early part of the fall. The indications for business during the first six months 1904 are uncertain. People are prosperous, with a good demand for labor. Farmers are in good financial condition. The prospect for building and new enterprises is small.

Demand for seasonable goods is excellent, including Stoves, Sleigh Stock, Skates, &c. Stocks and collections fair. Our people are prosperous, and labor is hired to full extent. Farmers' condition good. Building prospects very good for another year. Already some foundations going in for brick structures. The country is all right. Our trade would be better if our banks would occasionally loan a little money here instead of letting it all go East.

From Hardware Merchants in WYOMING:

The first part of this year demand was equal to the past three years, but fell during the last half, owing to drought and grasshoppers, which ruined the range north of us, while hail passed south of us. Stocks are being cut down. Collections are much below the average. The farming community have had a bad year, and money is very close with them, as it also is with the stockmen on account of low price of beef cattle. No labor employed here, except by farmers and at the coal mines. Demand for coal is good, and mines are running full capacity. The building prospect is about half what it was last year.

Trade during the first eight and one-half months of 1903 was a good comparison with the same months in the three previous years. Since the middle of September there has been quite a falling off in the demand for general merchandise. This condition seems to apply more severely to the class of goods carried by the leading Hardware houses; that is to say, Barb Wire, Wagons, Harness, Miners' and Builders' Supplies. The cause for such condition in this locality seems, in the main, to be the depressed condition of the market for live stock, particularly the market for cattle. We feel, to a limited extent, a sympathy with the distress in certain parts of the country caused by the water squeezing process in Wall Street during the summer and early fall. This last has led to a general feeling "that we had better wait a while" and see if the great tumble in the market price of corporation stocks will result in a general panic, or a tightness in money that will cripple enterprise along all speculative lines, such as prospecting, mining, reclaiming arid lands, &c. We believe the waiting period will soon pass. The marvelous financial strength that has been attained in the Middle West and in the Rocky Mountains and Pacific Coast States, backed by good crops and good prices for nearly all products of agriculture, makes a general panicky condition impossible, so long as the same enterprise, governed by reasonable conservatism, prevails as in the past ten years. Business in all lines in this locality ought to regain its normal condition by the time that the spring trade for 1904 opens. One thing is certain, there will be no panic in this neck of the woods.

We have had a good year's trade, the best we have known here. During the last two months trade has been slower, and collections much below what they should be, due to the low prices of sheep and cattle. The indications are that trade will be slower during the next six months. The hay and grain crops are good, and a large number of ranchmen are holding their stock for higher prices. There will not be much building and development until late in the summer and fall.

The Outlook for Hardware

Trade conditions have not been as good as in former years, owing to quite heavy "range loss" in stock and extremely low price of cattle and sheep, also heavy loss of farm crops by hail and frost. Stocks are fairly heavy, but collections are poor. An air of caution and carefulness pervades the country, and we do not look for anything but a very moderate trade. There are no idle laborers in this country; the people in general are fairly prosperous, but stockmen and farmers are blue. We are informed that some large companies are about to do some work in our oil fields, but do not know how true it is. Should such be the case, local conditions would be much improved.

From Hardware Merchants in MONTANA:

Trade for the present year in general has been as good as heretofore. Stocks are not large, but enough to supply the present demand. Collections are slow. We think business during the first six months of 1904 will not be rushing. The people as a whole are prosperous, but the decline in cattle and sheep has hurt them to a certain degree. There are quite a large number of idle men. The financial condition of farmers is pretty good, but there are quite a number that a panic would wind up. There are no prospects for building, and no new enterprises. Money seems to be getting closer and closer all the time. The banks don't care to loan except to first-class customers.

SOUTHERN STATES.

Virginia, **Florida,**
West Virginia, **Alabama,**
North Carolina, **Mississippi,**
South Carolina, **Tennessee,**
Georgia, **Kentucky,**
Louisiana.

From Hardware Merchants in VIRGINIA:

We think, taking it all in all, the year has been as good as any previous year, with the exception of 1902. The truckers in the counties adjacent to this city had a very good and profitable season, which always reflects upon the general prosperity, as this business annually brings large sums of money into circulation here. In regard to stocks, we are inclined to think that most of our dealers have been buying in a conservative way during this year, and that stocks in their hands are in consequence light. Collections have been up to the average. Our people are very generally employed, and most merchants have had a fairly good trade throughout the fall, and the laboring classes have had steady employment at good wages. There have been but few strikes during the year, and those we have had were of small proportions and did not affect business to any extent. The financial condition of our farmers is good. Many of them have paid off all the encumbrances on their farms, and they seem to live easily and well, and have money to spend. We consider that the prospects for building and new enterprises in this city and vicinity for the first six months of 1904 are very favorable. It appears that we may look for good business, as soon as the cold weather of the winter is over.

Our business for 1903 has been the best we have ever experienced. Good crops of wheat, corn, hay and apples have been of great benefit to us. Collections are not as good as the financial condition of farmers indicate they should be. The people are in a good financial condition, and labor is well employed. We do not look for much building next year.

From Hardware Merchants in WEST VIRGINIA:

The demand in some lines greater; others lighter, making the average about as in 1902. Business has been affected by light crops and unfavorable weather. One special feature is the tendency of jobbers to sell consumers, especially in Paints and Lubricating Oils. Stocks are about as in 1902, and collections slow. Our people are fairly prosperous considering a short wheat and corn crop this season. All labor that will work is employed; there has been a scarcity in farm hands. Our farmers, as a rule, in a fairly good financial condition. Building prospects are good.

Demand has not been as good as in 1902, nor has there been as much building as during that year. Stocks are of fair size, and collections are very slow. People are only moderately prosperous, and not much building or new enterprises contemplated. Labor is only employed part of the time. The financial condition of farmers is only fair.

Concerning the condition of trade, &c., in this section, past, present and future, we are just closing the most prosperous year in our business, our business far exceeding anything that we have ever done. The country in this vicinity seems to be, generally speaking, in a healthy state, and we look for a continuance of the present business for at least the first three months of next year. We feel that conditions warrant this, and think these conditions may continue for the next six months. One thing that may check this will be newspaper talk, &c., making the people afraid and thus causing more conservative attitude. Local conditions have been hampered somewhat on account of the drought that has prevailed here for months, thus making it impossible for the timber men to get their lumber, ties, &c., to market; but as the winter season has begun and we will doubtless have an abundance of rain, we look for this material to come to market, which will help us considerably. Collections are, generally speaking, good.

The past year has been very satisfactory. The demand for goods has been greater than in any other year, but it would have been even larger had it not have been for the slump in prices that has occurred in the past few months. Stocks are very light with the retailer, and comparatively light with the jobber, but owing to the fact that the retailer's demands are frequent and for immediate shipment, the jobber cannot allow his stock to get as low as he would like to have it at this season of the year. Collections are fairly good. December of 1903 does not cast quite as bright a light into 1904 as 1902 did for 1903. The new year will not start off with the rush that the year just ending did, and while labor is fairly well employed, it seems to be the main contention that stands in the way of business prosperity for the new year. While this is not a large farming section, what few farmers we have are in excellent shape, as they get a good price for everything they have to sell. The building outlook is not so good as a year ago, but believe it would be better if the labor question was settled. Taking it all in all, the new year does not have a very bright prospect in this section, as the coal business, which is the backbone of our business enterprises, is very quiet, and very little market for the product. However, if the labor trouble could be settled and adjusted satisfactorily we think all other troubles would adjust themselves in a very short time, and probably after the first three months everything would move on in 1904 as well as it did in 1903.

From Hardware Merchants in NORTH CAROLINA:

Better demand than other years. Good crops, cotton especially. Stocks are about the same, and collections good. Good general prosperity. The demand for labor in this section is excellent, and our farmers have money. Think there will be a good deal of building next year.

Our trade will show a falling off from last year, the past four months showing a heavy drop. The low price of tobacco is said to be the cause of dull trade, though with the high price the farmers have had for their cotton it puzzles us to see the cause for the condition of trade here. Our stock is lower than usual for this time of year. Collections are very good. Our section is fairly prosperous and in good condition. All labor

can find work. A good per cent. of our farmers are in good shape and above board. Building here is at a standstill for the present, but the past year has been a good one in the building line, and the grade of work is being raised all the time, as finer and a better grade of work is being required. We are sure business will improve early in the new year. In fact, we look for business to reach where it was for the first six months in this year, which was good.

From Hardware Merchants in SOUTH CAROLINA:

The business features of the year 1903, as compared with other years, have been decidedly more favorable. The trade has been affected in a few localities, where the crops were ruined by flood and drought. Our stock of goods at the present time is a little above the average. Collections are good, except in a few sections, where crops have been affected adversely by the flood and drought. The people are in a better financial condition than for the past few years, generally speaking. There is rather a scarcity of labor. Every laborer willing to work can find employment. Farmers are in a better condition than for the past year or two, except in a few localities. There is no present prospect of anything very important in the building line.

The demand for goods during the year 1903 has been especially good, and, of course, trade was the same until the tobacco crop came on. The low price offered for tobacco disheartened the growers and demoralized trade. Stocks are at present heavier than at this season a year ago, and collections have been very slow. A great many here plant tobacco alone, and the high price of cotton, of course, could not materially help them. Every one looks upon next year as a good year for business. Labor is scarce and the farmers find difficulty in getting the help they desire. Farmers, as a rule, are about even—just being able to meet their expenses for the past year. Building in this whole section is on a boom, and many new and substantial buildings are being erected. This will continue far into the new year.

Demand good. Special influences have been the high prices of farm products. Stocks and collections fair. People prosperous. Labor well employed and scarce. Financial condition of farmers better than in years. Prospect for building fair.

The demand for goods has been good, as compared with other years. The scarcity of cotton is affecting business by depressing cotton manufacturers. Stocks of Hardware are fairly good, while collections are satisfactory. We look for a good business for the first six months of 1904. The labor on the farms is not fully employed. The financial condition of farmers is pretty good, but collections are only fair. The greatest question with us is how to regain the labor for the farms. Laborers have wandered away, and will be difficult to get them back.

From Hardware Merchants in GEORGIA:

Our trade has been equally as large as in 1902, and we have every reason to look for a good 1904 trade. Lumber and cotton ties are very active, likewise naval stores, which goes to make the country prosperous at this time. The financial condition of the farmers through this section is as good as in previous years. There is nothing special before the public at this time to create any excitement in the commercial interests in this section, but only a steady growth.

Cotton is king in this part of the moral vineyard. When there is a good cotton crop, and it brings fair prices, business is good, no matter whether other commodities are high or low. The year 1903 opened with bright prospects, and business was good. It continued good in all lines until September, when every one began to realize that the cotton crop would be very short. Then came two months of dullness. November and December have been fairly busy, and collections have improved some, though still behind the average. Our people, as a rule, are in a fairly prosperous condition, especially the professional classes and merchants who have been at all conservative in extending credits. Farmers are not in as good condition as they were a year ago, caused by short cotton crop and evidenced by short collections. The present high price of cotton will help the farmers but very little, as the crop has all been marketed, but it will be an incentive to them to plant a larger acreage than ever, and the merchant who is willing to take the risk can sell all of the farm implements and supplies he wants to during the coming season on credit.

From Hardware Merchants in FLORIDA:

Demand about the same as last year, or perhaps a little better. Stock about the same as usual. Collections not good; cotton crop very short. Our people are not very prosperous. All laborers have employment. There are no prospects of new enterprises.

The demand for General Hardware has increased about 20 per cent. over 1902. The cause is the additional development and settlement of this section of the State. Stocks are a little heavier. Collections are always slow during midwinter, but have been fair throughout the year. The business conditions are good, and if the winter should be mild the prosperity of this section will be large. Labor is well employed and in demand. Financial condition of truck farmers good. Building only moderate.

Volume of business is considerably ahead of last year, occasioned largely by the local conditions. Cotton has for two years commanded a good price, and the yield in this section has been good. Our stock is at a point that will just allow us to keep our ordinary orders filled. Instead of carrying 1000 kegs of Nails in stock we have them down to about 400; other heavy lines in proportion. Collections are good. People are prosperous and labor is fully employed. Farmers in better shape than for years. No new building operations in sight at this time. The year 1904 will without a doubt show continued increase in the local Hardware business. We anticipate a very active year for 1904, and regardless of market conditions will have to carry stock enough to keep our customers supplied.

From Hardware Merchants in ALABAMA:

Demand 10 to 20 per cent. better than previous years. In Hardware, retailers' stocks are very low. Wholesale stocks as low as possible. Collections are fair, but not as good as should be. Prosperity of the people is improving steadily. There is employment for all who will work. Farmers' condition much better on account of good price of cotton this year, though many of them made very short crops. Good prospect for building and other new enterprises. This section is purely agricultural. Have made rather short crops for several years. Last year corn crop almost total failure. This year, however, farmers made best corn crop of years, and the good price for cotton has made up for the short yield. We anticipate a good business next year.

Our demand for goods is quite as good as in other years. The depression in iron making has affected business unfavorably. Our stock is heavy and collections are very good. The iron trade is in bad shape, but the farmers are in good fix. They have a good supply of corn, hay and meal to begin and make a crop next year. The price of cotton has made up for the loss in quantity. Labor well employed, while farmers are in better fix than in years. The prospect for building and new enterprises is not good.

From Hardware Merchants in MISSISSIPPI:

Have had an excellent business this year. Have a good cotton crop in this section, and it is bringing 12½ cents. Stocks are light. Best collections since 1861. The future is good. Farmers in excellent condition. More deposits in the banks from farmers than ever known.

The Outlook for Hardware

Prospects for building good. We expect the largest spring business on record. The only trouble is getting goods fast enough.

From Hardware Merchants in TENNESSEE:

Nineteen hundred and three has been an exceptionally good year in this territory. Good crops in 1902 and 1903, with prices for same high, are the principal reasons for the increase. Stocks are not as low as usual, taken as a whole, although most merchants have endeavored to buy as sparingly as possible of staple Hardware, fearing lower prices. Collections are good. The prosperous condition of the farmers in East Tennessee insures a continuance of good trade for some months. The building of turnpikes in this county will aid us materially in a local way. The only cloud we see is in the uncertainty of the maintenance of prices. If we had any assurance of protection along that line, would have none as to the demand for the goods.

The demands on us have shown a decided increase over previous years, due principally to fact that we have converted our business into jobbing almost exclusively, and are distributing a larger proportion of goods used in our lines. Owing to the fact that market on iron and steel products has been somewhat uncertain for the past few months, we have avoided buying, consequently stocks on these lines are light. The local conditions of the weather have not been favorable for the delivery of the tobacco crop, from which the farmers derive money at this season. As a consequence collections are not as good as usual. The condition of our territory is prosperous. Almost the entire population are employed. The prospects for buildings and new enterprises are not flattering.

From Hardware Merchants in KENTUCKY:

Have done about the same volume of business in 1903 as in 1902. At present time merchants are not disposed to buy as freely as they did last year. They do not anticipate their wants as far ahead and have not placed orders for futures on Poultry Netting, Freezers, Screen Wire Cloth, Screen Doors and other sundry goods, or for Harness and goods of that character, as freely as in the fall of 1902 for 1903 trade. Collections not as good as last year, for the reason here that our principal money crop is tobacco. Considerable corn is raised, some hay and stock, but still tobacco is considered the money crop, this being the largest tobacco growing county in the State. Last year at this time the farmers had marketed about $250,000 worth of tobacco. Owing to dry weather this year there has been no tobacco season, and consequently no tobacco has been marketed. The market price of the weed is very much depressed, and farmers and general merchants who supply the farmers are quite blue over the prospects. The hay crop was good here, but is not bringing as much money as it did last year, but the farmers are satisfied with the price of hay. The corn crop was a good average crop, with good prices. Labor has not been employed in the city during the past two months on account of the fact that tobacco don't move, and possibly 2000 workers who depend on tobacco in winter are out of work. Prospects for building not as good as last year, owing to financial scare, originating in the East. Our farmers where the crops have been fairly good are in a very fair condition financially.

Our business last season has been very satisfactory, except in regard to the profit. The volume of trade being so large, it seems that goods are being sold on closer margin each year. Our impression is stocks throughout the country are light, more so than for several years. Collections in some sections of our territory are excellent, especially where there has been a good cotton crop. In our immediate section tobacco is king, and as the price of this staple product is lower than for years, and no demand for it, it is causing very hard times with country merchants. Our farmers, however, seem to be in a more prosperous condition than for years. Everything has an air of prosperity on our farms. Labor is well employed in this section. We look for improvements in buildings in the coming year.

From Hardware Merchants in LOUISIANA:

Our trade has been about an average with past seasons. While the yield of cotton has not been up to the average, the price has been much better, thus making money more plentiful with our people than it has been for many years. Corn and garden crops have been in abundant yield, which adds to the prosperity of the people. Stocks are on the average, and collections are fairly good. Farmers especially are more prosperous than for many years past, many having more or less money in bank. Labor of all kinds are fully employed in this section. Prospect for more buildings for the coming season seems to be good.

Demand has been better than last year, owing to the high price of cotton. Stocks are about as usual. Collections are late, but we think will be all right. Cotton is good, but sugar dead. Unions prevent lots of work being done, but all who want to are working. The financial condition of farmers is good. Condition of labor and the slowness of railroads in handling goods prevent building. A good many persons would build but expect declines in prices.

SOUTHWESTERN STATES.

Missouri,	**Colorado,**
Arkansas,	**New Mexico,**
Texas,	**Indian Territory,**
Kansas,	**Oklahoma Territory.**

From Hardware Merchants in MISSOURI:

The general features of trade during 1903 have been very satisfactory, and general business better than last year. Locally, our business has been curtailed by the breaking of the levee and flooding of the lowlands, necessarily destroying crops in both Illinois and Missouri. Quite a good deal of our business came from the Illinois bottoms. Merchants are carrying good stocks of goods. Collections, as a rule, very good. All indications point to a good business in this part of the State for 1904. Financial condition of our farmers outside of the flooded district is good. No man need remain idle if he wants to work. We think the prospects for building in our little city are very good for 1904.

During 1903 we have sold more merchandise than in 1901 or 1902, the per cent. of profit being about the same. We believe all dealers in our line are inclined to reduce stock. Collections are slow, owing to local conditions. People are in usual condition as regards money. We fear that the zinc and lead ore markets will be dull. If such is the case, many miners will leave this section for higher wages in the West. Farmers are prosperous. Building will be of a substantial character, but only such as have been gotten under way at least with plans this winter. Generally speaking, we are not inclined to believe 1904 will be as good as 1903 was.

Demand for building material has been light during the year. Water covered a territory 6 miles wide and 30 miles long of our best farming land. Some feed was raised after this water went off, but was not merchantable. Think stocks are light; we are buying very sparingly, especially in Stoves. Collections are not as good as we think they should be. There should be a fair business for spring. There has been employment for all this year. No building is in prospect. We are almost entirely dependent on agriculture. Our farmers as a class don't venture ahead, but are easily discouraged; so we can't predict much.

The demand is a quarter less than in 1902, caused by wet weather first part of season. Stocks are heavy and collections good. General prosperity of people and financial condition of the farmer good, with a very limited prospect for building and other new enterprises, as building here has been overdone.

Our sales for 1903 are about 10 per cent. over 1902. Strikes have affected business very much. My own business did not suffer so much on that account, as I sell for cash, and all contractors buy on credit. I think, while stocks are not heavy, they are well assorted. People are prosperous; labor is well employed, and farmers are in good financial condition. Prospect for building depends on labor troubles. Much more building would have been done during 1903 had it not been that there were so many strikes.

Trade has been good with us all the year, except November and December. Low price of live stock has curtailed business for the present. This community is short about $80,000 on apples and wheat, which may influence spring trade.

Demand much better than preceding years. The general prosperity of the people has favorably affected business. Stocks are light and collections good. The people are prosperous, labor is fully employed, the financial condition of the farmer is A1.

From Hardware Merchants in ARKANSAS:

Trade has been good. Sales last year about 20 per cent. above the average of the last ten years. Cotton crop is short; the high price, however, more than compensates for the shortage. Stocks in hands of merchants are, it seems, rather large, but goods move well at this time of year. Collections are fairly good. The people here—*i. e.*, the majority—are prosperous and are getting over the effects of the drought two years ago. Labor is fully employed. The trouble has been a shortage of labor, but we are getting over it. Building enterprises have been hampered a good deal by high price of material and the scarcity of labor. Labor is getting more plentiful, and if lumber should decline it will stimulate building, also the sale of Hardware.

There has been an average demand. Short crops, especially of cotton, have unfavorably affected business. Stocks are fairly heavy, and collections only fair. The farmers are financially in fair condition. General prosperity is moderate, and there are good prospects for building and new enterprises. Business November and December in Hardware and groceries below normal; in dry goods a little above average. Good prices for raw cotton our salvation this year.

The demand has been as good this year as former years on general lines, and better on Builders' Hardware. There have been no special changes to affect trade, except the short cotton crop. The excess in price will not supply the deficiency in yield. Other conditions about same as in former years. Stocks are about the same. Collections are not so good. The people are in fairly good condition; plenty to live on, but very little money. Labor is well employed. The building outlook is good. Considerable slate deposits have recently been discovered near our town, which are being developed rapidly. That, with our vast amount of timber and stone, which is just now coming on the market, will probably add considerably to our business in the future. Town and country are in a very fair condition.

We have experienced the best demand that we have had for years, which has resulted from the building of a railroad. Stocks are fairly light, but collections are exceptionally good. The prosperity of the people is general, and all available labor is employed. All the farmers have plenty of money. A federal building and a canning factory are in prospect; also dwellings and business houses.

Demand a little better than 1902. High price of cotton has made business good since October 15. Stocks are large, and collections good. Labor fully employed and demand better than usual. No boom, but gradual and permanent improvements being made along all the line.

From Hardware Merchants in TEXAS:

My sales for 1903 will exceed those for 1902 by about 4 to 5 per cent., and will fall below the average of the past ten years by about 3 per cent., instead of showing a normal increase consistent with the general development of the country. There is a shortage in our principal money producing crop—cotton—caused by ravages of boll weevil. My stock on December 1 was about 17 per cent. larger than on December 1 last year. Collections are fair and will exceed those of the preceding year by about 4 per cent. While people are not prosperous, conditions are regarded as fairly satisfactory, deficiency in cotton crop being partly compensated for by the increased price realized for that which was made, and the harvest of grain and feedstuff has been bountiful. Farm labor well employed. In the industries, of which we have very few, labor is fairly well employed. Financial condition of farmers is, on an average, fairly good. There is no prospect for an increase in building and new enterprises over this year. Business during the first eight months of the present year was lighter than it had been for the same period in five years. I expect a fair demand for goods during the first six months of 1904.

The demand for goods was much greater compared to that in former years, and stocks, as a rule, are heavy this time of the year. Collections are good. The outlook for the following six months is very bright, and we look for a good business. There are no idle hands in this vicinity, as labor is well employed. The farmers generally are prosperous in this section. Prospect of building is fair; no new enterprise in view. This section needs rain to make it a banner year, but should rain not come we will not suffer very much.

The volume and profit in our business have been about the same as in 1902. Considerable uncertainty exists as to business conditions, owing to the uncertain crop conditions for the past four months. Stocks are about normal for this season. Retailers are buying cautiously. Collections are good. In our immediate section conditions are good. We will have fair trade as late as April. Labor is not as well employed as last year. Farmers are in good shape. Prospect for building is light.

The general features of trade during the season of 1903 have been normal. The demand for goods has been about the same as for 1901 and 1902. The most detrimental influence upon the Hardware business has been the boll weevil scare. The stocks of Hardware are rather lighter than usual. Collections are fairly good in all the territory not seriously affected by the boll weevil. Indications for the first six months of 1904 seem to be promising of good results. The extremely high price of cotton in a manner compensates for the short crop. Labor is fairly well employed. The farmers whose cotton crop was not ruined by the boll weevil have good bank accounts. In fact, the bank balances of this city are larger than usual. There are several large buildings projected and in process of construction. The year 1904 is somewhat of a puzzle on account of the boll weevil. We know that trade will be exceedingly poor in the territory where the boll weevil destroyed the cotton crop of 1903. We do not know what new territory may be attacked the coming season.

The demand has not been good. Business was affected by boll weavil in our cotton. Stocks are very light. Collections have been good on account of high price of cotton. Think the outlook for 1904 is encouraging and hope business will be better. Farmers are in good shape, considering our small crop. Will be very little building in our county. We have had a good holiday business in this section, better than for several years.

The Outlook for Hardware

From Hardware Merchants in KANSAS:

About the same as the last year. Trade has been affected by light crops, rural free delivery and catalogue firms. Stocks are light and collections poor. People are fairly prosperous, and labor is very well employed. Farmers are in rather poor financial condition. But little prospect of building and new enterprises in the spring.

Within a radius of 10 miles trade in general has been good. The demand has been good, owing to extraordinary crops. Stocks appear too heavy for the demand. Collections are above the average. The indications for business could not be better, and our people were never more prosperous. We have more work than we can find men to do it; and, as a rule, farmers are all independent. The prospect for building was never better. We think the farmer is getting more than his share. He does not pay as much for his comforts or necessities in proportion to his time and skill or outlay as the merchant or mechanic. He gets twice as much as he used to for his produce, and pays about one-half what he did for what he buys.

Demand during the first five months was below the normal; last seven months has been unusually good. Our large wheat crop has made trade of all kinds very satisfactory to the retailer. Stocks are generally well kept up, but do not think there is overstocking in any line. Collections may be classed as good. Farming population are generally prosperous. Land is advancing in price and many improvements are being made. This condition bids fair to continue during 1904. Common labor is scarce and hard to get at $1.50 per day. There is profitable employment for all who will work.

From Hardware Merchants in COLORADO:

Trade during 1903 has been about the same as in other years. Stocks are lighter than usual at this time. Collections were good early, but of late have been very slow and hard to make. I do not look for any heavy trade the coming year. Our farmers are paying their debts and for their lands. Will not have much surplus to spend in building. Some of them cannot even meet their obligations. This is a farming community, and crops the last season were not to say good, and in some districts very near a failure.

Demand has kept up through our entire line during this year, showing some increase over 1902, and this in face of serious labor troubles in several sections of State. Only influence affecting business in Colorado has been the stoppage in mineral and coal production on account of strikes. Stocks in Hardware lines, both Shelf and Heavy, not being kept as full as usual, mostly in anticipation of lower prices to prevail, and this idea seems to be in the minds of all. Collections, as a rule, good. Some difficulty or embarrassment is experienced in localities affected by labor troubles. People seem to be prosperous. Labor finds ready employment, and there is a scarcity of average laborers as well as skilled mechanics. Farmers are financially in better shape than for many years. Prospect for new building not quite as good for coming six months as it has been. The supply has in some ways exceeded the demand. This applies more particularly to storerooms than residences.

Volume of business in 1903 not as good as 1902, but what trade we had was more satisfactory. People generally are holding down expenses and paying as they are compelled to have things. From present indications business will be very quiet, in fact, dull, owing to numerous strikes. This we anticipate only for the first few months. After settlement of strikes we anticipate a good trade. We believe business men and farming people are better off financially than for a number of years past owing to their past experience in going into debt and the trouble of getting out.

Demand for 1903 has not been as good as last year. Light building operations, closing of steel works, unsettled condition of the market and labor troubles have seriously affected business. Stocks are fair, but lighter than last year. Collections have been up to the average. People are only fairly prosperous, as strikes prevent all labor being employed. Farmers are in moderately good financial condition.

In the agricultural districts of Southern Colorado the demand for Hardware this year has been fully 25 per cent. less than in 1902, due principally to the extremely low price of cattle, the light alfalfa yield, and practical failure of the sugar beet crop. In the coal mining districts south of Pueblo the Hardware trade has been nearly equal to that of 1902, but the big coal strike now in effect, with no prospect of settlement, is seriously affecting all lines of business. Stocks much lighter than a year ago. Collections very satisfactory. The coal mining towns have been very prosperous, many ordinary miners making from $100 to $150 per month, but the labor conditions that permit one agitator to dictate and enforce idleness among the hundreds is fast reducing the conditions of prosperity and plenty to one of discontent and want. Mechanics are still well employed, but no new enterprises are being planned. Farmers, while their income has been small, are not in debt. With resumption of work in mines there will be considerable building early in spring.

Our trade during 1903 has been a little greater in volume than for 1902. Conditions locally have been very favorable, and collections have been good. With the exception of strikes in the mining regions, we do not think Colorado was ever in so prosperous a condition as at present. Crops were good and prices for produce are high. Building in the cities has been enormous, and prospects for continued improvements bright. We believe the labor troubles are practically settled, and that we may look forward to 1904 with every expectation of a prosperous year.

Business in general in this section compares fairly well with 1902. Mining has not been quite up to the standard, and our oil interests have not come up to expectations, but the farmers have had good crops, and the general financial condition is healthy. Stocks in all lines are large, and a good many complain of poor trade. Labor trouble, to some extent, has been the means of demoralizing retail trade.

From Hardware Merchants in NEW MEXICO:

First part of 1903 was too wet, and the latter part too dry. Our new railroad was finished, and no other work for the natives. Stocks are heavy, as all anticipated good trade. Collections are on the bum, and money is very tight. Drought has made it very doubtful in regard to business during the first six months of 1904. Labor is idle at present, but the building outlook is fair. Ranchmen seem hard up, indicated by their buying 10 cent Axle Grease, instead of the 25-cent size. We hope that the outlook will turn out as contemplated, but panics in the East have an influence in the West. We wish that the Hardware dealers in New Mexico would get together and form an association, same as they do in other States, instead of trying to fight each other.

Nineteen hundred and three has been the most prosperous year that we have ever had. Volume of business larger, collections better, and we have sold a better class of goods than in former years. The outlook for the future of our section could not be better. The number of new enterprises that have been established here, also the large number of people from different sections of the East coming in, has put in circulation a great deal of money, which has given our city and country a good permanent start. In fact, if we had not seen the accounts of the tightness of money in Eastern papers, we would not have known there was any money stringency in the last few months. Our native people—the Mexican

—are adopting American ways more and more each year. Are buying improved machinery and are not satisfied with just raising enough to live on, but are now looking ahead to raising enough to net them a sum of money beyond their requirements for living purposes. New Mexico to-day is positively the brightest place in the Southwest for business in all branches.

My business has been the best for years. This no doubt has been caused by our country becoming more settled, and the Indians taking more to agriculture, thus creating a demand for goods in our line hitherto unknown to the Navajo, such as Barb Wire, Mowing Machines, Hay Baling Machines, Wind Mills, &c. Our stocks at present are very heavy, owing to the increased demand and to the uncertainty as to quantity required, through the new enterprises that are being constantly opened up. Collections are exceptionally good, and what is most gratifying, the people are no more asking indefinite credits. The outlook for 1904 is good. We are expecting a new railroad to come through here from Durango, Col., to the copper belt in Arizona. Work has just commenced on the Zuni Indian irrigation system; $100,000 has been appropriated by the Government for this purpose. The Zuni village is just 40 miles south of us, so we will no doubt sell a good quantity of supplies for this work. Our coal mines are all running full blast, the Indian traders all report a good business, and I may safely conclude by saying that this portion of New Mexico is enjoying a liberal share of prosperity.

Demand with us has been ahead of other years. Locally, we think stocks have increased the past year. Collections are not good. People are fairly prosperous. All labor is employed here. The financial condition of farmers is not good as a whole. Prospects for building and new enterprises are good.

The year has been exceptionally good in the Hardware line. Bills being paid promptly by the farmers. If we have rain in the next ten days, business will be good; if not, we will look for a dull year in the farming implement line, although we should have a very good trade, as the Tonto reservoir will be built.

Demand not so good as in 1902. Decline in price of cattle principal cause of this. Stocks are light. Collections not good. Ranges are being run with less help every year. Majority of cattlemen in debt. No prospect for building or new enterprises.

From Hardware Merchants in INDIAN TERRITORY:

Trade has been very dull throughout the entire year owing to a bad cotton crop last year, followed by a worse one this year. Collections have been very poor. There is no doubt that this is the worst year for business that this section has ever experienced. Indications for business during the first six months of 1904 are slightly encouraging to those of us that are in shape to do a credit business, but the cash business will necessarily be slim, as there is comparatively no cash in the country. It is arranged now so that the Creek Indians can sell part of their land, and this will bring in desirable immigration as well as considerable money, and will, of course, make business better.

Demand light. Extreme wet weather in early spring followed by severe drought caused cotton to be very late. With some boll worms and early frost and freeze made almost complete failure. Not much grain this season. Farmers closely pressed. Collections, generally, have been bad. We think stocks are moderate in Hardware. Most retail merchants have been buying lightly. Implement trade has been light. Conservative merchants are loaded with last year's goods. Others are loaded with past due paper. Prosperity of people not good. Not much labor employed. Condition of farmers is not good. There will be but little building done here soon. Trade will be confined to necessities. We look forward to a fair business in our lines, as we think dealers will be more conservative and competition not so sharp.

Trade very light, owing to bad cotton crop. Stocks are light and collections poor. No better outlook for another year. Labor, generally, idle. No money in country. Territorial conditions are peculiar, owing to Congressional action, which will determine whether new enterprises will come in.

The demand has been somewhat smaller than in other years. The opening of the country west of us has called for more goods than last year. Stocks are rather light, with fairly good collections. People are prosperous in this section, but the weather is too dry and wheat is doing badly. Labor is fairly well employed. The financial condition of farmers is above the average, due to good wheat crop. The prospects for building are not very good, owing to financial stringency. We think next year a good one in which to keep near shore financially, but expect to keep doing business at the old stand regardless of panicky prophecies.

The demand for goods in comparison with last year is very light, something like two-thirds as many goods used. This is caused by short crops in this locality. The corn only made one-fourth crop, and as the prices of cattle and hogs are so low, it gives the farmers but little resources at this time of the year. The stocks all over this country, I think, at present are heavy, more especially in Stoves and seasonable goods. Collections are very bad at present, and this is the time of the year when every one that can is anxious to get his debts paid; but if they are farmers they have nothing to pay with, and the local conditions of the banks make it impossible for them to borrow money, no matter what their collateral might be. The prospects for business in the Territory for the first half of 1904 are anything but flattering, as we are dependent on the farmers. There are a great many laborers idle at present, and I am afraid they will be idle most of the time this winter. The financial condition of the farmers could not be more discouraging, as they have so little to sell, and the prices are so low for what little they do have that they cannot afford to sell it. There is not much prospect for building over the territory for a few months, at least.

The demand for Hardware has been very light. No new building in town or vicinity. The uncertainty of land ownership, prior to the allotment of lands to the Indians, has made the improvements of a makeshift order. Those having the greatest expectancy have, as a rule, lost heavily in the cattle business. The small farmers (renters) have been the best pay. Collections are slow. Stocks are about average. We cannot call the people prosperous; though we look for better business from now on, as the land will be cut up in small farms and not held in large tracts as formerly. We cannot expect to have a good class of farmers until we have some provision for schools. There is no provision made for education, except on a subscription basis, outside of incorporated towns. Give us a show and we will be as great a Hardware using community as there is in the country.

From Hardware Merchants in OKLAHOMA:

Fall business light. No demand for holiday goods from the farmers. Year's business about one-fifth less than usual. Low price of cattle and hogs one of the principal causes. Hardware stocks in this part of the Territory good and heavy. Collections are good. The laboring people are hard up, with not much to do. Farmers are, as a rule, in good shape. No town building and very few farm houses and barns being built. We look for a very light business this spring. Prices of stock so low that people are going to carry them over. Wheat crop very late. We have had a very dry fall.

Demand and stocks are good, as are collections. General prosperity not as good. Has been dry here. Laborers all employed. Farmers' financial condition only fair.

The Outlook for Hardware

Pretty good prospect for building and new enterprises. Owing to the dry weather here this fall, the wheat crop will be cut down. The cotton crop was good. Had a good broom corn crop.

There has been an increased demand as compared with last year, influenced by good crops sold at good prices. Stocks usually are heavy. The prospects are not flattering for the next six months. Small amount of building in the near future. No new enterprises. Farmers are beginning to complain of hard times on account of low prices of stock. Labor is reasonably well employed.

PACIFIC STATES.

Washington,	**Idaho,**
Oregon,	**Utah,**
California,	**Arizona.**

From Hardware Merchants in WASHINGTON:

In a new country like this it is hard to compare the demand with other years. In 1902 we had a large demand for Hardware, on account of the construction of canals for irrigation. This year the demand was heavy for Builders' Materials and Farm Implements. Stocks, as a general rule, are heavy. Collections are only fair. We anticipate a large immigration to this part of the State this spring. There are 10,000 acres of irrigated land waiting for settlers, and that acreage is capable of supporting 15,000 people. The farmers that have orchards in bearing or have alfalfa meadows are very well off. As much as $500 worth of apples has been taken from 1 acre of apple trees, and $1000 per acre netted on cherries. There will be more canals built this summer and homes established, and farmers and merchants alike look for the year of 1904 to be a banner year in the Hardware and building trade.

The demand for general Hardware has been good on Implements, Wagons and Buggies—trade not as good as last season. Our stock of goods somewhat heavier than last year. Collections for goods sold this year have been good, but were not so good on all notes carried over from last year's business. Think business for the coming six months will be about the same as last year for same season. The people generally seem to be doing quite well. Labor is about in the same demand as last year at this time. Farmers are doing very well, but are inclined to go into debt in order to buy more land. The prospects for building are fully up to last season.

The year 1903 has been the best the Hardware trade has ever seen in this section. The holiday trade has been a record breaker and has astonished the few people who were saying that we were entering upon a period of hard times. There has been more building in 1903 than in any previous year in the history of the city, not excepting boom times. The growth has been steady and substantial, and new factories are locating here every month. The people in general in this vicinity are in a very prosperous condition. This is especially true of the producing class. With good crops and sky high prices for hops, hay, oats, &c., the farmers are virtually "on velvet." Labor is well employed, and everything looks bright for 1904. The lumber and shingle business is quiet at present, due to lack of demand in the East. This, however, is looked upon as temporary.

Demand as compared with other years is 25 per cent. better. The recent Building Trades Council strike has been a detriment to business during the past three months, but the strike is now settled, the council having practically lost its fight, and the result is a split in the unions. An agreement has been signed, which will prevent a strike or demand for an increase of wage for a year. Stocks are fairly heavy and collections good. Our people are very prosperous. It is difficult to find laborers to perform the labor on projects under way. The financial condition of the farmers is good. Though the wheat crop was lighter than in past years, the prices have been better. Oats and hay were good crops and brought good prices. Gardeners and fruit growers very prosperous. The prospect for building and new enterprises for 1904 is better than for any previous year. The year just closing has been the best that the State of Washington and the city of Tacoma have ever known. There has been an increase of 100,000 in the population of the State and 10,000 in the city; an increase in the jobbing trade of the city averaging from 25 to 30 per cent.; an increase in the number of men employed in the mills and factories of about 15 per cent., and a corresponding increase in the retail trade; an increase of 60 per cent. in building permits issued; increase in value of improvements of 90 per cent. Lumber shipments by water have increased 20 per cent. and flour exports 25 per cent. The chief cause of the expansion of business in the city has been the growth of manufacturing interests; besides the enlargment of plants in existence, between 35 and 40 new ones have been established during the past year.

From Hardware Merchants in OREGON:

Our trade this year was more than 25 per cent. better than in any previous year in our history. This was due largely to the great demand for lumber, which caused great activity in the logging camps. The mining camps in our vicinity have contributed greatly to our trade; in fact, more has been done in those camps than ever before. Our trade in Builders' Hardware has been heavy this year, and the same thing applies to all lines of the Hardware trade. We are carrying a very heavy stock for this season of the year. Our collections this fall have not been as good as we expected; still they are not bad. Our people have been unusually prosperous the past year. Laboring men of all classes have found plenty of work during the year. The farmers, as a rule, are well fixed financially, and are able to pay cash for what they get. This is so to a greater extent than ever before. The prospects for building for the year 1904 look very bright.

Demand and our sales have been larger than for many years. Large emigration has caused this increase. We have a full stock. Collections are good. People are prosperous, and labor is well employed. Farmers are in good financial condition, with good prospects for building and new enterprises.

More goods sold during 1903 than for several years. Good crops and fair prices. A large immigration was settled in our part of the valley. Stocks are light at present. Collections have been very good. Diversified farming in Oregon has done much toward bringing prosperity to the State. More new dwellings and barns were erected during the year just closed than in any year in the history of the State. The new impetus in building with the increased work in the woods and mines have given plenty for all to do, and laborers have been scarce during the summer months. Farmers are generally in better financial condition than usual.

From Hardware Merchants in CALIFORNIA:

This has been our banner year. A great many new buildings are being erected. Thanks to our Hardware Association, profits have been above the average. We think the merchants here are carrying fully as large stock as is usual at this time of the year, but the tendency is to reduce stocks. Collections are very good. We honestly think the first six months of 1904 will be equal to the same period of 1903, and if it were not to be election year we think next year would, as far as this city is concerned, be the largest in its history. Lots of new enterprises are being started here at the present time; all our mechanics are working. The infallible rule is that if they do little shopping they are doing it well. As for new enterprises and buildings, we think the latter part of the year will slacken off on account of elections.

Our business has been heavy with farmers and the farming community and in excess of last year. The fruit and cereal crops were good in the Sacramento Valley, and fair prices were realized for wheat; $1.25 to $1.50 per cental (100 pounds) being paid, against 80 to 90 cents to $1 in former years. This condition alone has helped our community and stimulated trade, produced a more cheerful feeling and given a firmer tone to land and real estate values. Collections have been good and better than usual. Money is cheap and plentiful, and can be borrowed by farmers as low as 5 per cent. per annum. As far as we can see, the prospects are good for 1904, as a great deal of land is already sowed to wheat, &c.; more than usual, the season being favorable.

The demand has been about the same as last year, with no special influences affecting business. The indications for business during the first six months of 1904 look promising. This is a labor union town, but if we do not have labor troubles and prices do not go all to pieces business will be O. K.

The demand for Hardware has been about the same as last year. Closing of some of our local mines has had a tendency to curtail business in general. Stocks are light and collections slow. This is a mining and not a farming center. No prospect for building or new enterprises.

Business for 1903 has exceeded that of 1902, due, we think, to better prices for grain. Stocks heavy, collections very good. Prospects for 1904 are excellent. Farmers all making money and prosperous. The question of irrigation is receiving more attention, and canals are being constructed, which will result in subdivisions of large tracts, diversified farming and increased population from the East.

From Hardware Merchants in IDAHO:

Demand in 1903 has been greater than in other years. Stocks are about as usual at this time of the year, owing to decline on heavy goods, such as Iron, Nails and Wire. A larger stock is now carried, having bought earlier than usual for spring trade. Collections are good in this section. The people are prosperous, with no idle men in this section. Financial condition of the farmers is good, and collections are good.

The demand is good, with prospect of new enterprises. Stocks are well assorted and there is no difficulty with collections. The people generally are prosperous and labor fully employed. The financial standing of the farmers is quite satisfactory. Our section is in a prosperous condition, and we expect good business for six months to come. New lands are being opened up and substantial people are coming to our locality.

On general principles trade has been better this year. The outlook is very promising for next season. Stocks are light. We have to be very conservative and confine ourselves to cash basis. People are fairly prosperous; and labor is well employed.

Business in our line for the last three months has been about 20 per cent. heavier than for the corresponding months last year. Collections have been a little better also. The banks seem to have plenty of money to meet all requirements, but farmers, as a rule, are not borrowing. We look for heavier trade in the Hardware line for the next year, as there is going to be considerable building in this locality. The farmers have received good prices for their crops, and are not borrowing much. A new sugar factory is to be built near here, which is taking considerable material and labor, and it is estimated that there will not be near labor enough in the country to meet the demand for the coming season.

From Hardware Merchants in UTAH:

The demand for Hardware in this immediate territory for the year just ending has been well up to previous years. Especially is this true on heavy goods. Our mining industry is in a prosperous condition and miners have purchased liberally throughout the year of mining machinery and structural materials. Stocks in jobbers' hands are light in most instances, they having been playing a waiting game for the past 60 days in anticipation of a decline in prices. People as a whole are quite prosperous and labor is well employed. We are just pulling out of a strike in the coal field, in the southern part of the State, but otherwise we have had no labor troubles to speak of. Building trades are free from them. Farmers were never in better condition. Through the use of irrigating ditches a great deal of heretofore useless land has been reclaimed, which adds greatly to the wealth of the farming industry. There is considerable new building under consideration.

From Hardware Merchants in ARIZONA:

After several very dry years we have had some rain, and, with a prospect of the purchase of a storage reservoir, the "Tonto Dam," for storing water for the irrigation of the Salt River Valley, the feeling is good and prospects bright. Stocks are not excessive, about an average. Collections very good. This is an agricultural country, everything depends on irrigation; if we have rains, which seems probable, there will be good grain and grass crops, and farmers will do well. Pasturage is too scarce and high for stock raisers to make any money this winter. Very little building just now.

THE FAIRBANKS COMPANY.

THE FAIRBANKS COMPANY, Broome and Elm streets, New York, are about to issue an illustrated pamphlet devoted exclusively to showing their various branch houses in the United States and foreign countries, of which there are 14 carrying stocks of goods, in charge of their own salaried force. This work will indicate the growth and scope of the business of the Fairbanks Company as a general supply house, in addition to the immense line of Scales for all purposes, the company handling almost everything in the way of factory and mill supplies, &c. On the left of each leaf is an illustration of one of the branch stores (headed by the main establishment in New York), opposite each picture being a brief description of one of the many departments which are identical throughout the chain of depots. The following enumeration of departments affords an idea of the great range of the business: Scales, Valves, Steam Packings, Gas Engines, Trucks and special Baggage Wagons for transportation companies in great variety, Power Transmission, machinery, Machinists' Hand Tools, Pipe Fitting and Cutting Machinery, Letter Presses and Copying Appliances, General Mill and Factory Supplies, Steam Specialties, Iron Pipe and Fittings, Plumbers' Supplies, Railway Supplies and the export department. In addition to their main foreign house, 78-80 City Road, London E. C., for handling exported material, they also have agents and representatives in all the principal countries of the world, branch houses in Boston, Baltimore, Pittsburgh, Buffalo, Montreal, Toronto, Vancouver, Winnipeg, Hartford, Albany, Philadelphia and New Orleans. Especial attention is directed by the company to the large force of salesmen employed, particularly in this country, and to the fact that the territory covered by this chain of warehouses is thoroughly taken care of, possessing an up to date organization and modern facilities for marketing the wide range of merchandise manufactured by the company and many representative concerns in the lines enumerated above.

C. E. Harper and Wright & Parks, Sidney, Neb., have consolidated under the style of Harper & Wright, and will continue the Shelf and Heavy Hardware, Stove, Tinware, Agricultural Implement, Sporting Goods and furniture business. Next summer the new firm expect to erect a building, 30 x 90 feet, two stories high.

Norvell-Shapleigh Hardware Company's Establishment

THE NORVELL-SHAPLEIGH HARDWARE COMPANY of St. Louis, Mo., moved into their new building, to which the accompanying illustrations relate, in the early part of 1903. The old building which they vacated was located on the west side of Fourth street, corner of Washington avenue. The new one is immediately opposite, on the east side of Fourth street The location of the building is an ideal one, being in the heart of the wholesale district, seven of the main street car lines of the city passing the door, and the Eads Bridge, the only bridge over the Mississippi at St. Louis which carries street cars, foot passengers and teams, opens into Washington square, directly opposite the building. It occupies the entire space bounded by four city streets. The Main Street Station at the terminus of the Eads Bridge is at once to be greatly enlarged and improved to take care of the immense passenger traffic which will pour into St. Louis in 1904 for the World's Fair. Nearly all the large terminal freight stations on the east side of the river are located in close proximity to the Eads Bridge, and the majority of the terminal freight stations on the St. Louis side of the river are strung along the river front, also close to the Western terminus of the Eads Bridge; thus giving the building a short haul for outgoing and incoming freight, and giving the location the shortest average haul to the freight stations of any portion of St. Louis. The building is constructed of steel and concrete throughout, the first story being of stone, the upper stories of hard burned buff brick with terra cotta trimmings. The interior columns are supported by massive stone piers and footings so substantial that the building, having been in use now for nearly a year, and being very heavily stocked with Hardware, has not settled in any part enough to make a visible crack. The floor construction is a combination of suspension and compression bars forged to and braced on heavy steel I-beams, being filled around with concrete fire proofing, some 300,000 sacks of cement being used in the fire proofing throughout the building. After the completion of the flooring, a panel was selected at random by the architects, cut loose on the sides from the surrounding panels, so that the entire support was from the ends, and then loaded with a dead weight of over 1200 pounds to the square foot. The deflection permitted by the contract was ½ inch with this load; the actual deflection under the strain was a scant 5-16 inch. The building is designed to carry a dead weight of 400 pounds to the square foot on any floor and at any point. The building is nine stories in hight, the basement being 13 feet, first floor 20, second and eighth floors 14 and the balance all 11 feet. Six freight and two pasenger elevators give quick access and freight service to all parts of the building. An automatic electric dumb waiter in a fire proof shaft connects all floors with the city department on the first floor. Opposite the openings into the stair shaft on each floor, which are covered by automatic fire doors, is located the desk of the floor manager, who in this way sees whoever comes into his department. Main aisles sufficiently wide to admit of large platform trucks carrying freight divide the floors at right angles, and smaller aisles for lighter box trucks lead to all parts of the floors for ready access to the stock. A sectional view of the building is given in Fig. 1, from which a comprehensive idea may be obtained of the uses to which the various floors are put. The idea worked out in the general interior plans of the building has been to have all goods gravitate from the stock floors to the assembling second floor, where they are packed and by a steel chute sent to the shipping department, from which they are hauled at all hours of the day to the various freight stations. When goods are sent down to the shipping floor from any stock department a shipping ticket giving description of the packages and weights is dropped through a galvanized iron tube opening into the shipping department office, where the dray tickets are made out by a force of copyists, and are ready by the time the goods are assembled. Two steel chutes to the cellar from the sidewalks on Washington avenue and Fourth street handle heavy goods stored in that department with a minimum of expense and time.

The fire protection has been worked out in thorough co-operation with the St. Louis Fire Prevention Bureau, in order to insure the very lowest possible insurance rate. Two stand pipes connect direct to the three steel storage tanks on the roof, which supply, under pressure, the sprinkler system throughout every part of the building. Should an incipient fire fuse a sprinkler head, either in the day time or at night, the lessening of the pressure on the system, as shown by the gauges in the basement, immediately makes electric connection with an alarm to an engine house located one block distant. The department responds, drawing up to one of the large windows on Third street, in which is located an automatic signal, showing whether the sprinkler head has opened in the east or west system. The first engine on the scene immediately couples up to the stand pipe supplying that system. The firemen go up the fire escape, a man entering

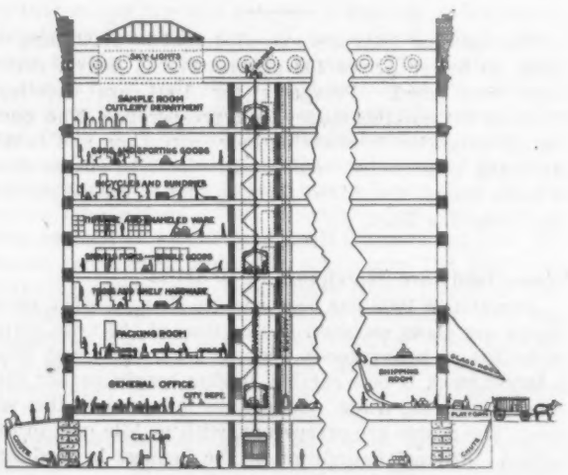

Fig. 1.—Sectional View of Norvell-Shapleigh Building.

each floor to locate the cause of the trouble. This automatic alarm system being tested at noon each day makes it positive that any fire starting in the building would bring the Fire Department to the exact spot inside of five minutes.

The first floor is devoted to the main office, accounting room of the house, the shipping room and the receiving room. The office, shown in Fig. 2, is planned so that the departments whose business it is to come in direct contact with the trade are located next to the door. The accounting department and filing department are in one end of the room where bookkeepers and filing clerks will be least interrupted. The buying department is located with ample space on the main floor, where buyers can talk with Eastern salesmen free from interruption. All buyers are located in the main office. In many jobbing houses buyers of departments have their offices on the stock floors, where they are supposed to have supervision over the executing of the orders. In this house all matters pertaining to the execution of orders are in the hands of experienced, practical stock men, the buyers being responsible for the buying of the goods only. The city department is directly opposite the main entrance. The mailing department, where the errand boys are located, is in the center of this floor, where boys can be called by push buttons and where the incoming and outgoing mail is handled. The receiving department is on the Fourth street side of the building, separated by a partition from the main office. The shipping department, Fig. 3, is on the Third street side, the level of this part of the floor being elevated to the hight of a wagon bed and having a

large freight platform outside, Fig. 4, covered by a wired glass canopy as a protection from the weather. The freight elevator opening into the receiving room has also a door on the shipping platform, and by this general arrangement there is no mixing up or confusion between incoming and outgoing freight. The office of the shipping and traffic department is on the main office floor, separated from the elevated shipping platform by a glass partition with windows through which business can be readily transacted, but which protect the main office from the low temperature of the shipping room in the winter time, that being necessarily open to the air throughout the day.

Fig. 2.—The Main Office.

The city department in the main office has speaking tube service to all floors and an electric dumb waiter for the rapid handling of goods, the capacity being 350 pounds at a load.

In the main office is located the telephone switchboard and operator, stations throughout the building giving communication from any floor in the building to any point in the city or to long distance lines. Throughout the main office no roll top desks are permitted, and no office furniture of a hight which would interfere with a clear view of the entire office from any point. The effect of this upon a visitor entering the room is very striking. This room is lighted by six arc lamps, in addition to incandescent lamps on every desk. All communication with the office is held through one central main entrance on Washington avenue, there being one door on Third street for the use of the city department only. Visitors are not admitted to the stock departments, except when authorized by a pass secured from the doorkeeper.

On the first floor back of the main office are located the toilet and cloak rooms for male and female employees. These are commodious, admirably lighted, have tiled floors and are fitted up as handsomely as in any of the best hotels. A timekeeper records the time of each employee as he or she enters the cloak room in the morning, at noon or at night. Male employees are expected to be on their floors ready for work at half past seven, take their lunch from twelve to one and leave at six o'clock in the evening. Female employees are to be ready for work at eight o'clock in the morning, take their lunch from half past twelve to half past one, and leave at half past five in the evening. In this way they are kept entirely separate

Fig. 3.—Shipping Department.

and distinct while going to or coming from the cloak rooms. By having all cloak rooms and lockers located in one place, there are no unsightly corners cumbered with old clothing, hats, shoes, &c., which are not only very untidy, but uncleanly and unwholesome.

The second floor is the main assembling room for the stock clerk, are put in box trucks and sent down on the elevators, rolled to the table upon which the goods are laid out by him, and the trucks run underneath, where they are out of the aisles. As fast as an order is laid out and checked back it is marked ready for packing, and the packers follow up the clerks closely, getting the goods

Fig. 4.—Freight Platform.

building, the general idea being that when goods are selected on the other floors, as the orders are gotten out, it is quicker and cheaper to drop them down to the main assembling floor than to carry them up. A portion of ready for the roll back, under whose supervision they are assembled, weighed and slid down the steel chute from the dormant scale to the shipping floor below, Fig. 6, thus saving time and elevator service. A glass showcase

Fig. 5.—Tables for Laying Out Goods.

this floor is devoted to Shelf Hardware, with shelving and bins similar to those on the third floor, the larger part of it, however, being filled with tables for laying out and packing goods, shown in Fig. 5. The tables are built at such a hight from the floor that the uniform type of box truck used for Shelf Hardware can be run underneath. Loose goods gotten out on the upper floors, and marked with the name of the second-floor or a 700-pound cask of Chain can be slid down the chute with perfect safety.

The second floor is, of course, the busiest in the house. Time, floor space and the demands of the country trade make it essential that all orders be gotten out of the way with the least possible detention. Minutes count, and the table space, which is sufficient for laying out the goods on current orders, would be entirely in-

adequate should these orders be delayed by poor system on an average of 12 hours more than the time now required. On this floor every one is on the jump, and a clerk to hold his own and to make a creditable showing on the large blackboard giving the weekly records must be in good physical condition and must have an active mind. A careful record of the number of pages handled and the number of errors made is weekly posted for the emulation of all, and competition for the head of the list is very keen. A fire proof vault on this floor holds the electro plates of catalogue pages and a large supply of catalogues. Special importance is laid upon having all goods shipped to the customers in neat, handsome shelf boxes. No dusty, dirty or shop worn goods are ever sent out. Any goods of this character which are found in the shelves are either put in new boxes or packages or thrown on the job counter.

Every one throughout the house is educated that an order takes precedence over everything, and any delay whatever is to be reported at once to the department manager for necessary action. Porters and stock clerks handling trucks of Hardware have the right of way on all floors and aisles, and in every possible way the house motto of quick action is carried out.

The third floor is devoted to Shelf Hardware, the floor being filled with shelving projecting in steps from the bottom, illustrated in Fig. 7, so that no ladders are necessary, the stock clerks being able to step up to the top ledge, from which they can readily command all the upper shelves. For two years past this company have devoted a large share of their attention toward perfecting and enlarging the lines of special Tools and Hardware manufactured under their own brands. The advantage of this to the retail merchant can be seen at a glance when the shelving on the third floor, with its neat, handsome labels, uniform substantial boxes, is seen along the aisles running the entire length of the building.

The fourth floor is devoted to Steel Goods, Shovels,

Fig. 6.—Chute in Shipping Room.

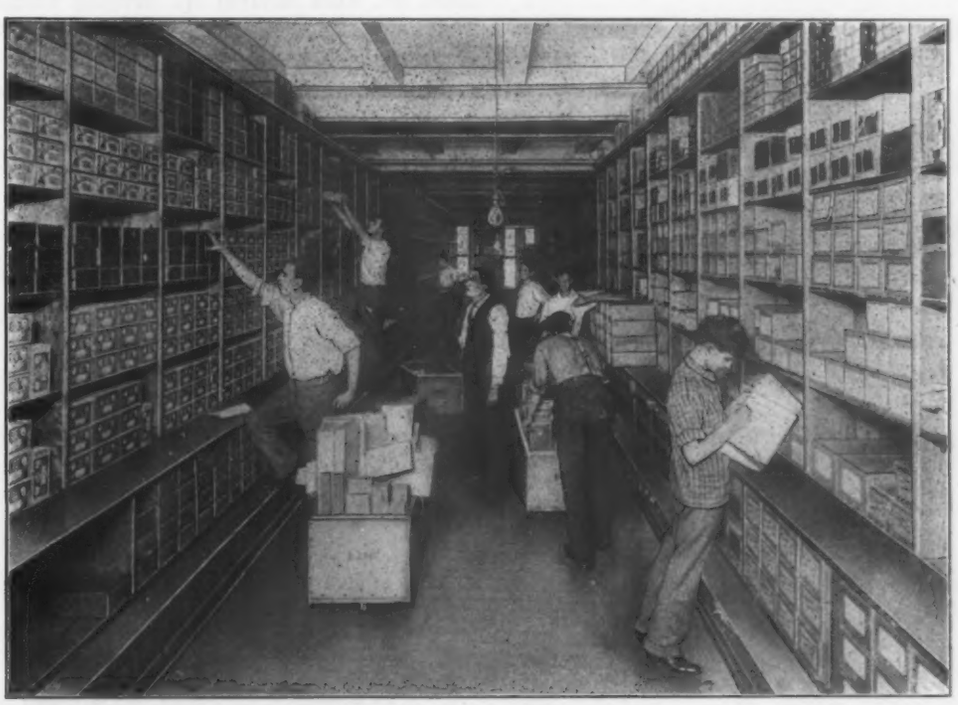

Fig. 7.—Shelving on Third Floor.

Spades, &c., the floor space being largely taken up with double bins carrying the stock solid up to the line of the sprinkler pipes on the ceiling.

The fifth floor is devoted to Tin, Enameled and Japanned Ware, shown in Fig. 8, and as goods of this character are very susceptible to damage, all orders calling for them are handled and packed on this floor by packers who have had many years of experience in their special line.

Fig. 8.—Tinned, Enameled and Japanned Ware on Fifth Floor.

The sixth floor is devoted to the Bicycle department. The Bicycle repair shop is located in another building across the street in order to avoid the raising of insurance rates upon the entire stock carried in the main building.

The seventh floor, a view of which is given in Fig. 9, is devoted to the Gun and Sporting Goods department. Two rooms are separated from the floor by steel nettings under lock and key; the Pistol room and the room for putting up salesmen's samples. These rooms are under the charge of trusted employees, business with them being transacted through windows in the netting, no one being permitted inside but the clerk in charge and the manager of the department. The floor is largely taken up with closed bins, the character of the goods demanding protection from dust and dirt. Such goods as Hunting Coats, &c., when received are carefully wrapped in individual packages and laid in closed bins in order that customers may depend upon receiving them in just as fresh, good condition as when they came from the manufacturers' hands. In the Pistol room is carried a record, by factory number, of all American Double Guns and Smith & Wesson and Colt's Revolvers, so that goods stolen from any customer and found in the hands of outside parties can be absolutely identified.

Fig. 9.—Guns and Sporting Goods Department on Seventh Floor.

The automatic motor for the electric dumb waiter is located on the eighth floor. By the touch of a button the dumb waiter is brought to or sent to any desired floor in the house. The danger of accident is minimized by the electric power being cut off when any door into the shaft is open, in this way making it impossible for a clerk put-

Fig. 10.—Cutlery Department on Eighth Floor.

ting his head into the shaft to be injured by the descending cage. The dumb waiter motor is one of the most satisfactory pieces of machinery in the building. It does its work admirably under all demands. At times goods have been caught between the dumb waiter and the shaft, wedging it and of course stopping its movement. The machinery simply stops without even burning out a fuse, and when the obstacle is removed is as ready for work as before.

The cutlery department, Fig. 10, is located north of the elevator shaft, running across the entire width of the building. This department is inclosed in steel netting with a spring lock on the door, and the desk of the manager is located where it commands the entrance into the department and the entire length of it, so that whatever work is being done is under his direct supervision. A skylight overhead and windows at each end give ample light and make the arrangement of this department an ideal one for a class of goods which requires, as every Hardware merchant realizes, close watching.

At the south end of the eighth floor is located the sample room. In days before rapid elevator service became common it was always deemed necessary to have the sample room on the first or second floor, so that customers should not be called upon to climb many flights of stairs to buy their goods. This is, we believe, the

Fig. 11.—A Model Retail Hardware Store on Eighth Floor.

first jobbing Hardware house in the country to break away from old traditions in this regard. A sample room located as this one is, on the eighth floor, with skylights overhead, gives the daylight which is so greatly needed for this purpose, freedom from dust, freedom from noise and freedom from the constant interruptions which cannot be avoided on the first floor of a jobbing house. With a handsome elevator running at the rate of 250 feet per

minute the eighth floor of a building is more accessible than the second floor of any where stairs must be used, and a customer taken to this sample room can transact his business without having his attention distracted, save his time and that of the busy salesman. In the present day Hardware catalogues are so complete, their illustrations from photographs of the goods giving a merchant, in many cases, a better idea than the actual examination of the goods themselves, that the lines which are found necessary to sample are much fewer than they were in bygone years. In the center of this sample room is located a model retail Hardware store, Fig. 11, fitted up with shelving, cabinets and appliances manufactured by the J. D. Warren Mfg. Company of Chicago, for whom Norvell-Shapleigh Hardware Company are the St. Louis agents. These fixtures are utilized to display samples, to illustrate to the merchant how he can save space and time in the fitting of his store, and few new stocks are sold in this sample room that do not start out with a complete outfit of Warren shelving and fixtures.

The ninth floor is mainly used as an air space, the portion over the elevator shafts being used for the electric motors—five in number—inclosed in fire walls with skylight overhead. The motors are located in the center of this space, readily accessible from all sides. The overhead skylight does away with all dark corners in which rubbish is so apt to accumulate in basement engine rooms. The electric motors have been neatly painted and striped, the floor also painted, so that a daily mopping does away with all dust, the principal enemy of electric machinery. The motor room is at all times as clean as a parlor and presents a radical contrast to the average dark, greasy and untidy engine room of mercantile estab lishments. The placing of motors on the top floor is a modern idea. In this way they take up the least valuable space in the building, require less cable to be watched and at intervals replaced, and gain light and freedom from dirt. A large part of the floor is of heavy, ribbed glass, giving daylight down the elevator shafts.

The basement extends under the sidewalk on all sides, and is lighted by illuminated tiling and windows under the low bulkheads. The ceiling being 13 feet high admits of the storage of immense quantities of heavy goods, and the space under the sidewalk, utilized in the same way, will accommodate many carloads of goods. In the basement are located the main valves for the two sprinkler systems. If there should be through an accident on any of the stock floors a sprinkler head knocked off word is immediately sent to the basement, where the supply valves are closed, the drainage valves are opened, and the water being thrown upon the stock is at once cut off. The floor of the cellar is of concrete and pitches toward the elevator shaft, in the bottom of which are located large drains into the main sewer, with the necessary traps. Any amount of water through broken pipes or valves would immediately drain away as fast as it could flow in. In the basement is also located a battery of boilers, at present used only for heating the building, but of sufficient capacity to supply ample power should it be deemed advisable to do so at any time in the future. Necessary room for coal, cinders and pump for the sprinkler system is provided in the basement, where are also located water and electric meters.

Across the street from the main building is located the printing establishment and Bicycle and Gun inspection shop. The placing of these in the main building would of necessity raise the insurance rate on the entire stock, which accounts for their location. The shop, shown in Fig. 12, is operated by electric power, is equipped with two printing presses, cutting and punching machines, lathes, drills, forges and all the necessary equipment for taking care of the repairs and inspections necessary with a concern handling so large a Bicycle and Gun business. The room is well lighted by windows at either end and a skylight overhead. In the print shop are turned out the price pages sent twice a week to the salesmen giving new prices and all changes, the catalogue inserts representing new goods, and the general letters issued from time to time to the salesmen.

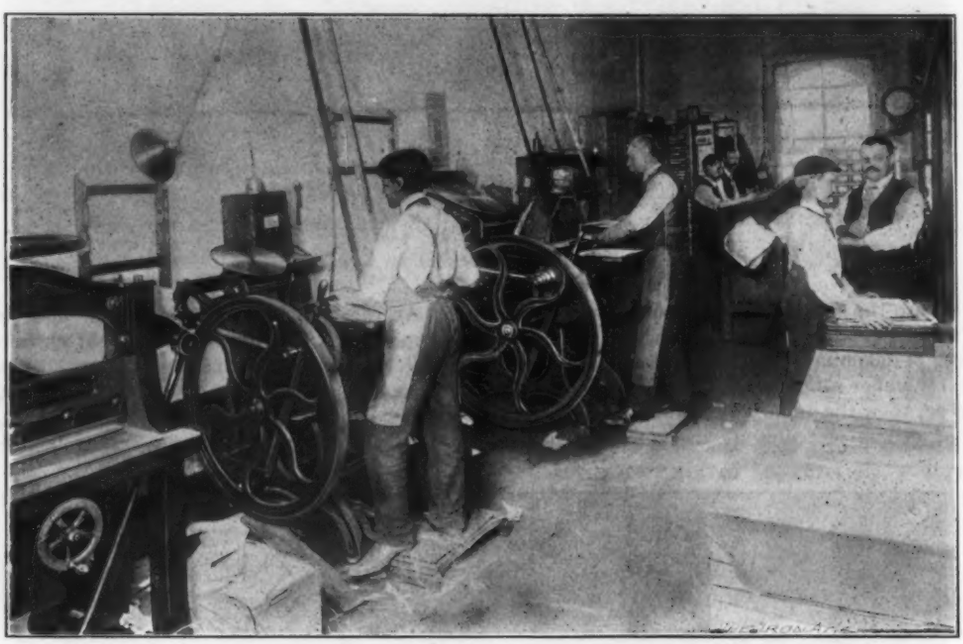

Fig. 12.—Stationery and Printing Department.

Orders are written up by the salesmen by departments on different order sheets. When the mail is opened these orders are stamped to show the date and hour when they reach the house, are then registered on a card system, one for each customer and containing the special instructions for handling his business. The ideas of merchants differ radically in many respects. Some insist upon their orders being filled absolutely without any change, and any goods which cannot be supplied at once to be canceled. Others prefer to have the jobber use his judgment in making substitutions and wish goods which cannot be supplied at once back ordered and shipped later. It is impossible to trust to memory for details of this kind, therefore these special instructions are copied by the register clerk on the individual orders. The sheets are then separated and carried to the respective departments, where the goods are gotten out and sent down to the assembling floor to be checked back and packed. In this way an order sent in to the house is almost immediately being worked upon in all departments at the same time, which means a great saving over the

old fashioned plan of having one clerk work an order from the top floor down to the bottom.

The forms shown in Figs. 13, 14, 15 and 16 are used for orders, as follows: Mail order blank, Fig. 13, is for distribution to the trade throughout the country, printed in copying ink so that a merchant may write his order, copy it and then send it in to the house. Mail order blank, Fig. 14, is used in the house for copying up mail orders which come in such a way as not to be convenient for handling on the original. Back order blank, Fig. 15, is for such items as cannot be supplied at once, but must be ordered from the factory or are coming in but not promptly enough to warrant holding the original order. Salesmen's order blank, Fig. 16, is used exclusively by the traveling salesmen and house salesmen. A yellow slip marked "Notice" is inclosed in every box packed in the

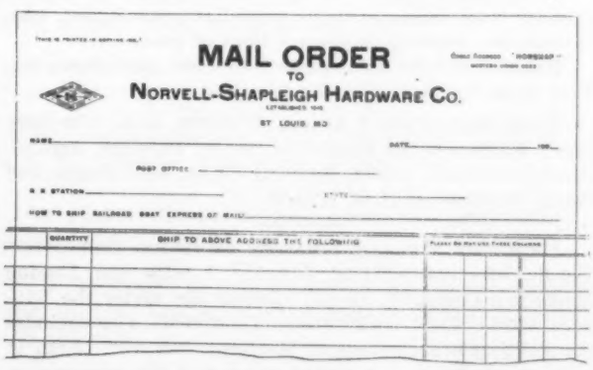

Fig. 13.—Mail Order Blank Distributed to Customers.

house as an additional assurance that no goods will go out in a condition which will unfit them for being placed upon a merchant's shelf. A label with a cut of the building in the center is pasted on all boxes when run out on the shipping platform.

The expense of operating each department is made up from the salaries paid to the employees in that department, the supplies used by the department and the amount of floor space occupied. It has been frequently the case that a house having run along on old fashioned lines for many years, and then departmentizing their business, have been surprised to find that for years some one or two de-

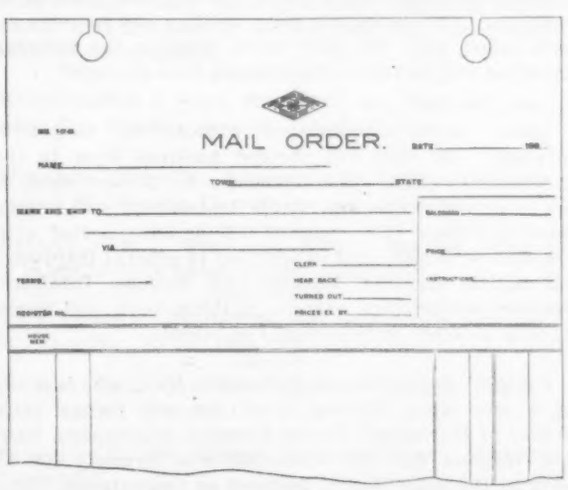

Fig. 14.—Mail Order Blank Used in the House.

partments have been operated at a loss, which was not discovered as the general results of the business were satisfactory.

The president, of course, has the general administration of the business, and to him all department managers are directly responsible for the work, conduct and efficiency of the employees under them. Matters concerning the administration of any department or discussions of matters from one department to another are always carried on through the head of the department, so that he may be in close touch with the work that is being done under him. The president receives a report at the close of each month giving the number of employees in each department and the expense of operating it. These being tabulated, comparisons from month to month or from year to year are simple and leaks promptly cut off.

Mail order business is given special prominence in all the plans of this business. From the time the orders come into the house they are handled by the most experienced

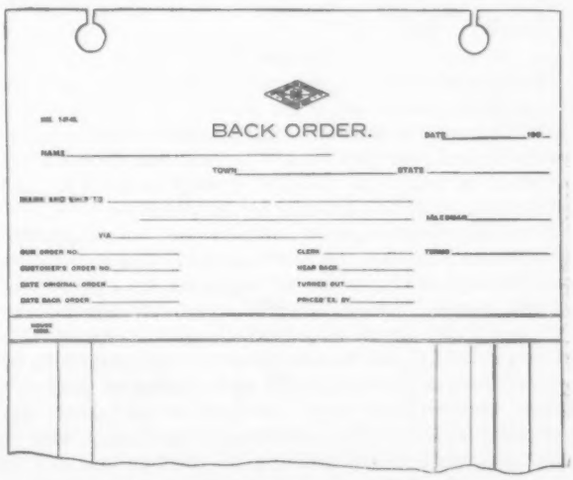

Fig. 15.—Blank for Back Orders.

men, who see that no delays are permitted under any conditions, that the goods sent are those fitted to the particular wants of the locality where they are to be used, and that the prices entered are based on the lowest market quotations. A large mail order business is the best evidence of the confidence which the merchants at large have

Fig. 16.—Salesmen's Order Blank.

in a jobbing house and the interests of the mail order customer are always looked after most carefully.

We are indebted in the preparation of this descriptive article to L. Howard-Smith, office manager of the Norvell-Shapleigh Hardware Company.

JOHN S. LENG'S SON & CO.

JOHN H. LENG'S SON & CO., dealers in Bicycle Parts and Sundries, who for 43 years have occupied the building at 4 Fletcher street, New York, have purchased the Bicycle branch of the business done by C. B. Barker & Co., at 93 Reade street, which will be consolidated with their own and carried on by John S. Leng's Son & Co. hereafter at the latter address, C. B. Barker & Co. continuing their business as heretofore in Sewing Machine Needles, Oils and Supplies, without change, in the upper portion of the same building as in the past. John S. Leng's Son & Co. will continue to occupy 4 Fletcher street as a warehouse, they having carried on the agency for the Weldless Steel Tube Company, Limited, Birmingham, England, for 34 years at that address, and which still remains a part of their business. This house are importers of and dealers in Iron and Steel, Weldless Cold Drawn Steel Tubes and a number of specialties, such as Leng's Improved Lever and Cam Valve, Portable Railway Siphon, Lansdell Steam Siphon Pump, &c.

THE LATE MORTIMER C. OGDEN.

AT a recent meeting of the Board of Governors of the Hardware Club the following tribute to the memory of the late Mortimer C. Ogden was presented by E. C. Van Glahn, chairman of committee previously appointed. The minute was adopted by the board and ordered entered in its records:

In Memoriam.

Mortimer C. Ogden, a governor of the Hardware Club of New York, died October 15, 1903.

Mr. Ogden's business life was devoted to the advancement of varied and important interests, but his influence was also fruitful in the accomplishment of much for the higher welfare of the community in which he lived.

From his early years he had possessed in an unusual degree those qualities of energy, integrity and determination which are the fundamental requisites for a successful business career. These features of his character were soon appreciated by all who were brought in contact with him, and blended, as they were, with a patriotic love of country, with a broad minded and intelligent grasp of affairs, and with a deep interest in religious and benevolent objects, his maturing years found him a prominent figure in the military, in the business and in the church life of the city in which he lived.

Mr. Ogden attained an honorable and an enviable position in these his chosen fields of activity. He was one of the original members of the Twenty-third Regiment of Brooklyn and for years a captain in that regimen. He was a director in several large New England manufacturing concerns and for 25 years president of the Eagle Lock Company. He was connected with the Board of Trustees of Plymouth Church, which he served as its chairman, and contributed lavishly, but unostentatiously, to its charities and benevolences.

Mr. Ogden will always be remembered by those who knew him best for his genial, kindly nature, for his manly virtues, and for his lively interest in all causes to which he had pledged his support. He possessed a rare capacity for work, was devoted to the duties of any trust committed to his charge, and adhered unalterably to right and noble principles.

In his home life Mr. Ogden was a true and devoted husband and father. He was animated by an abiding faith and lived up to his religious beliefs. These characteristics, coupled with a courteous, dignified bearing, made him a fine type of the Christian gentleman.

Mr. Ogden was a charter member of this club, one of its Board of Governors from the first, continuing in the earnest and fruitful discharge of his official duties until his death. His abilities were of a high order, and his personal qualities were such as to win and retain in the club a host of friends who miss him sadly. Ever ready with suggestion and counsel, active in interest, unsparing in effort, he was an associate whose worth and sterling qualities were fully recognized by his fellow members of the board, who unite affectionately in this tribute to his memory.

SARGENT & CO.'S CONDENSED LIST AND DISCOUNT SHEET.

SARGENT & CO., New Haven, Conn., and 149-153 Leonard street, New York, have just issued a compact, comprehensive and admirably arranged condensed list and discount sheet, No. 4, applicable to their 1901 general catalogue. It contains 208 pages, each 11 x 8 inches, and follows the arrangement of the catalogue. On page 4 is a description of finishes. Page 5 gives information pertaining to special work. Page 6 relates to uniform discounts on design goods, Lock Sets, Knobs, Escutcheons, &c., treated in detail in the pages following to page 117, inclusive. In this department miniature half-tone illustrations, about 1½ inches high, showing the upper portion of each design, are reproduced on each page in connection with the various designs, to save unnecessary reference to main catalogue when the buyer does not readily recall appearance of set. Pages 89 to 117, inclusive, contain a condensed list and numerical index of Locks, Knobs, Escutcheons, &c. Pages 118 to 199, inclusive, a condensed price-list of General Hardware of their manufacture covering pages 260 to 1003 of the catalogue, with accompanying discounts, thus giving at a glance the list of any article with its discount. The remaining pages, applying to general lines not of their manufacture, contain discounts as they were formerly published, referring only to the goods briefly, together with any necessary changes in lists. The entire book is a well considered and thoroughly worked out mass of data, in such form as to be of great service to all who handle the goods of this company.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

REQUESTS *for catalogues, price-lists, quotations, &c., have been received from the following houses:*

FROM STRICKLAND & STEELE, Waverly, Kan., who have lately purchased the Hardware, Stove, Tinware, Agricultural Implement, Paint, Sporting Goods and Wagon and Buggy business of H. J. Willett.

FROM THE WILLIAM KILLGORE COMPANY, Gainesville, Texas, who consolidated January 1 with the London Hardware Company, also of Gainesville, under the Killgore style. This combination of interests also includes the Killgore branch store at Marietta, Ind. Ter. John P. London has become an active member of the corporation, the authorized capital of which has been increased to $100,000, $90,000 paid in. The company handle Hardware, Stoves, Wagons, Buggies, Farm Implements, furniture, groceries, carpets, &c., at wholesale and retail.

FROM HANSEN BROS. & Co., Hildreth, Neb., who have recently incorporated their Hardware, Stove, Farm Implement, Paint and Sporting Goods business with a capital stock of $20,000. They are building an addition 24 x 60 feet, which will provide a storeroom 48 x 140 feet.

FROM THE LEE HARDWARE COMPANY, Salina, Kan., whose Hardware and Paint departments, with the building in which they are contained, have been entirely destroyed by fire, entailing a loss of $50,000, fully covered by insurance. The company's main building and contents remain intact, only the outer parts, such as the shipping platforms and roof over same having been damaged.

FROM AMBROSE-HENDERSON MERCANTILE COMPANY, Loveland, Col., who will succeed Ambrose Bros. in the Hardware business about February 1. A new block is now in course of erection, which the company will occupy about that time. The company will be incorporated with a capital of $40,000, and in addition to general Hardware will handle Harness, Buggies and Wagons, furniture, groceries, queensware, carpets, clothing, boots and shoes, &c., and possibly Agricultural Implements.

FROM W. S. CHURCHILL, Coffeyville, Kan., who is erecting a new store building, which he will occupy as a retailer of Hardware, Stoves, Farming Implements, Buggies, Wagons, &c. Mr. Churchill was formerly for 15 years in the same line of business at Osawatomie, Kan., but sold out in the early part of the present year.

FROM LAUER & SCHULTZ, Macungie, Pa., who have just succeeded Aaron Weinberger in business. The line carried embraces Shelf Hardware, Iron and Steel, Paints and Oils, Glass, Blacksmiths' and Mining Supplies, Agricultural Implements, Sporting Goods, &c.

FROM THE SHATTUCK-GEORGE IRON COMPANY, Wichita, Kan., who have just commenced the jobbing business in Iron and Steel, Heavy Hardware and Wagon and Carriage Materials. The company have been incorporated, the principal stockholders being S. W. Shattuck of Sedgwick, Kan., who has been engaged in the retail Hardware business at that point for the past 25 years, and F. W.

George of Wichita, who has been selling Heavy Hardware in Southern Kansas and Oklahoma for the past ten years. Mr. George was for a number of years with the Robison Heavy Hardware Company of St. Joseph and has been with the Massey Iron Company since their organization. The new company's salesmen will cover Southern Kansas and Oklahoma.

FROM TILLMAN HARDWARE COMPANY, Quitman, Ga., who were burned out completely on the 27th ult. The firm intend to resume business, and will value catalogues and price-lists pertaining to the general line of Hardware and Agricultural Implements.

FROM HORN BROS., Greenville, Ohio, who have lately embarked in business, handling General Hardware, Stoves, Queens Ware and groceries.

CALENDARS, ETC.

WM. CABBLE EXCELSIOR WIRE MFG. COMPANY, Brooklyn, N. Y.: Calendar with large monthly sheets.

THE JOLIET BRIDGE & IRON COMPANY, Joliet, Ill.: Monthly hanger calendar.

J. S. MITCHELL & Co., Hardware merchants, Sherbrooke, Quebec: Leather covered memorandum book with yearly calendar.

GOODELL-PRATT COMPANY, Greenfield, Mass.: Hand painted monthly hanger calendar.

MONTANA HARDWARE COMPANY, Butte, Mont., dealers in Hardware, Supplies, &c.: Hanger calendar with large scale map of Montana.

H. S. EARLE, 705 Fourth avenue, Detroit, Mich., sole sales agent for North Wayne Tool Company: Celluloid receptacle (with calendar) for the keeping of court plaster or postage stamps.

ALBUQUERQUE HARDWARE COMPANY, Albuquerque, N. M.: Monthly hanger calendar.

THE PHILIP CAREY MFG. COMPANY, Lockland, Ohio, Magnesia Flexible Cement Roofing and Pipe Coverings: Monthly hanger calendar.

JOHN ROURKE & SONS, Savannah, Ga., founders, machinists, &c.: Monthly nanger calendar.

WHITNEY COMPANY, Albuquerque, N. M., wholesale and retail Hardware: Monthly hanger calendar.

DETROIT SAW & STAMPING WORKS, Detroit, Mich.: Desk calendar with thermometer attached.

C. H. CASEY, Hardware and Machinery, Jordan, Minn.: Monthly hanger calendar.

PUTNAM NAIL COMPANY, Neponset, Boston, Mass.: Monthly hanger calendar.

SAMSON CORDAGE WORKS, Boston, Mass.: Monthly desk calendar.

THE HULL BROTHERS COMPANY, Danbury, Conn.: Folding Steel Vest Pocket Rule.

ERNEST LAW & Co., Iron and Steel, Philadelphia: Monthly hanger calendar.

M. R. MANHARD, Hardware merchant, Marquette, Mich.: Monthly hanger calendar.

THE SPECIALTY MFG. COMPANY have perfected an organization at Marengo, Ill., and are capitalized at $60,000, to manufacture Curry Combs and other specialties. W. A. Sheldon is president of the company, and A. Corson and J. Q. Adams are also interested.

MISCELLANEOUS NOTES.

Improved Goodell Miter Box.

The Goodell Mfg. Company of Greenfield, Mass., have made some important improvements in their all steel miter box, which was illustrated in *The Iron Age* of July 2, 1903. The company point out that the improvements add greatly to the convenience of the device. All boxes are now graduated, which will save much time for the operator in making changes, especially when two opposite cuts are desired at exactly the same angle. The most important improvement which the manufacturers have made is the addition of automatic stops to hold up the saw so that both hands of the operator can be used in placing the work. There is nothing complicated in the operation of the box as now made, but everything is simple and instant acting, and the manufacturers feel sure that the changes will add much to the value of the box. The box is constructed entirely of Bessemer steel, thus doing away with all liability of breakage, the backs being of cold rolled steel, corrugated to ¼ inch in depth and ½ inch in width, thus allowing a perfect clearance for sawdust. The boxes give 10½ inches width at right angles and 7¼ inches at the miter. The box is made in two sizes, both of which can be furnished with extra angle attachments to increase the angle above 45 degrees. These can be put on old or new boxes at any time, and are sold separately when desired.

R. P. Whipple & Co.

R. P. Whipple & Co., Springfield, Mass., in a folder recently issued illustrate and describe Whipple's adjustable blind hinge and Whipple's carpenters' bench hook. The latter device is made of steel and malleable iron, and is very durable. It is adjustable for any thickness of board, and may be fastened in position with three ordinary wood screws. This tool is especially useful to carpenters who are out on a job and obliged to do more or less planing on a temporary bench. The hook can be readily fastened to a table or plank, or will hold a door or board to be planed on edge. Whipple's improved adjustable blind hinges are made of malleable iron, with wrought iron galvanized plungers and oil tempered steel strings, with case hardened steel collars. The manufacturers claim that they are easy to put on, as it is not necessary to trim the blind, and surface or flush hinges will not interfere with molding when blinds are open. No other fastenings are required to hold the blind open, half open or closed. The hinge can be made right or left by changing the pin.

American Lock Nut Company.

In our issue of December 17 we gave an illustrated description of a new portable punch, as put on the market by E. D. Etnyre & Co., Oregon, Ill. The punch is, however, manufactured by the American Lock Nut Company, recently incorporated with a capital of $125,000, of whom Mr. Etnyre is president. The company's manufacturing operations are at present confined to portable punches, shears and bull dog lock nuts, but several other lines will be added from time to time.

According to the *Oregon Timberman* a shingle saw made by Henry Disston & Sons and in use in the shingle mill of the Far West Lumber Company in Tacoma, Wash., recently sawed diagonally through a forged carriage arm 11-16 inch in diameter, making a cut of 5 inches without injury to the saw.

Office, Bank & Library Company, 157 Summer street, Boston, Mass., have acquired the plant and good will of the business formerly known as the Boston Wire & Art Metal Company, and will hereafter carry on the manufacture of art wire work, bank grilles, ornamental iron, brass and bronze work in connection with their other factories for the making of metallic bank and office furniture, steel and wood interior fittings, filing devices, &c. They have also secured the services of A. F. Cuerier and Frank Wear, both of whom were for many years officially and actively identified with the Boston Wire & Art Metal Company.

United States Clinker Hook.

United States Wire Mat Company, Decatur, Ill., have recently put on the market the United States clinker hook, shown in Figs. 1 and 2. It is made of wrought steel throughout (with the exception of wooden handle grips), is 4 feet 3 inches long, weighs 4 pounds, and, it is said, will not lose its shape on account of heat. The

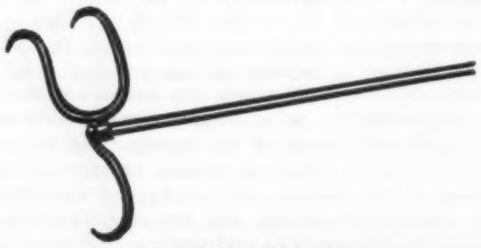

Fig. 1.—Clinker Hook, Open.

three prongs which constitute the jaws, for gripping and instantly removing with ease clinkers from heating furnaces, &c., are opened wide or shut tightly around the clinker by simply turning the right handle grip, which is the upper end of the inner shaft, the third prong being the lower end of the same shaft. The prongs are sharp

Fig. 2.—Showing Prongs Closed Around Clinker.

and will not allow the clinker to slip until the operator purposely releases it. The advantages of this implement are referred to by the makers as making it possible for man or woman to remove clinkers from furnaces at any time without soiling the clothing or burning the hands, at the same time obviating the necessity for unnecessary shaking of the grate, thus saving much coal.

Rollman Food Chopper Display Stand.

The Rollman Mfg. Company, Mount Joy, Pa., for whom John H. Graham & Co., 113 Chambers street, New

Rollman Food Chopper Display Stand.

York, are direct representatives, are manufacturers of a comprehensive line of specialties in the way of kitchen utensils, one of which is a line of Rollman meat and food choppers, Nos. 11 and 12, designed to retail, respectively, at 50 and 75 cents each, a still larger one of the same pattern being in course of preparation for marketing later in the year. One of the newest features connected with the choppers is a sample board, about 8 inches square, of ⅞-inch stuff, stained red, on which to display half a dozen choppers, which will stand upright on the thumb screws as long as three choppers remain. In the center of the board is a label, with directions and space indicated at which to clamp the choppers. A display card in a wire card holder is sent with board. The board serves to keep the choppers together and give them an individuality of their own. Among the other goods produced by the company are cherry seeders, peach stoners and apple cutters.

Engineers' New Oiler and Torch.

Noera Mfg. Company, Waterbury, Conn., are introducing the combined oiler and torch shown herewith. It is made of heavy steel, copper plated. The fuel is furnished from the body of the can, so that the torch is

Engineers' New Oiler and Torch.

all ready for use, and it will burn, it is explained, 30 minutes without tilting the oiler. The cap is put on the torch for the use of the oiler in the daytime. The point is made that the combined oiler and torch, when in use, permits locomotive and stationary engineers always to have one hand free.

Quarter Century Silver Ware, Monterey Design.

M. S. Benedict Mfg. Company, East Syracuse, N. Y., and Ottawa, Ill., have recently put on the market what they call Quarter Century silver ware, in the Monterey design, here illustrated, which is made in a large line of staple and fancy pieces—*i. e.*, forks, spoons, knives, &c. This ware is not graded as standard, single, double, triple or quadruple plate, but, irrespective of such designation, they give an absolute guarantee for 25 years.

Monterey Design.

Current Hardware Prices.

REVISED JANUARY 5, 1904

General Goods.—In the following quotations General Goods (that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33⅓@33⅓ & 10% signifies that the price of the goods in question ranges from 33⅓ per cent. discount to 33⅓ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued June, 1903, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Abrasives—

Adamite in Carloads:
Crystal ₱ ton $90@100
Grain ₱ ton $120@140
See also *Emery.*

Adjusters, Blind—

Domestic, ₱ doz. $3.00 33⅓&10
North's 10%
Zimmerman's—See *Fasteners, Blind.*

Window Stop—

Ives' Patent 35%
Tapiln's Perfection 35%

Ammunition—See *Caps, Cartridges, Shells, &c.*

Anvils—American—

Armand Hammer, Wrought ₱ lb 8½@8¾¢
Buel Patent Trenton ₱ lb 9½@9¾¢
Eagle Anvils ₱ lb 7¼@7¾¢
Hay-Budden, Wrought 9@9½¢
Horseshoe brand, Wrought 9@9½¢

Imported—

Peter Wright & Sons ₱ lb 10½¢

Anvil, Vise and Drill—

Millers Falls Co., $18.00 15&10%

Apple Parers—See *Parers, Apple, &c.*

Aprons, Blacksmiths'—

Bull Bros. Co. 30&5%

Augers and Bits—

Com. Double Spur 70¢10@75%
Boring Machine Augers 66⅔@70%
Car Bits, 12-in. twist 60@60¢10%
Jennings' Pattern 50¢10¢5@60%
Ford's Auger and Car Bits 40&5%
Forstner Pat. Auger Bits 25%
C. E. Jennings & Co.:
No. 10 ext. lip, R. Jennings' list 25&10%
No. 30, R. Jennings' List 60&10%
Russell Jennings' 25&10&2½%
L'Hommedieu Car Bits 15&10%
Mayhew's Countersink Bits 45%
Millers' Falls 50&10&5%
Pugh's Black 20%
Pugh's Jennings' Pattern 35%
Snell's Auger Bits 60%
Snell's Bell Hangers' Bits 50&10%
Snell's Car Bits, 12-in. twists 60%
Wright's Jennings Bits (R. Jennings' list) 50%

Bit Stock Drills—See *Drills, Twist.*

Expansive Bits—

Clark's small, $15; large, $26 50&10%
Clark's Pattern, No. 1, ₱ doz., $26; No. 2, $18 50&10%
Ford's, Clark's Pattern 50&10@60%
C. E. Jennings & Co., Steer's Pat. 25&10%
Swan's 60%

Gimlet Bits—

Common Double Cut gro. $2.75@3.00
German Pattern gro. $4.00@4.25

Hollow Augers—

Bonney Pattern, per doz. $10.00@11.00
Amos 25&10%
New Patent 25&10%
Universal 90%
Wood's Universal 25%

Ship Augers and Bits—

Ford's 40%
Snell's 40%
C. E. Jennings & Co.:
L'Hommedieu's 15&10%
Watrous' 33⅓&10%

Awl Hafts, See *Hafts, Awl.*

Awls—

Brad Awls:
Handled gro. $2.75@3.00
Unhandled, Shouldered gro. 63@66c
Unhandled, Patent gro. 66@70¢
Peg Awls:
Unhandled, Patent gro. $1@1¼c
Unhandled, Shouldered gro. 65@70c
Scratch Awls:
Handled, Common gro. $3.50@4.00
Handled, Socket gro. $11.50@12.00
Hurwood 40%

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—

First Quality, factory brands $5.40
First Quality, jobbers' brands $5.00@5.25
Second Quality $4.50@4.75

Axle Grease—See *Grease, Axle*

Axles—

Iron or Steel
Concord, Loose Collar 5@5½c
Concord, Solid Collar 5@5½c
No. 1 Common @4½c
No. 1¼ Com. New Style 4½@5c
No. 2 Solid Collar 4½@5¼c
Nos. 7, 8, 11 and 12 60¢5@60¢10%
Nos. 13 to 15 6@5@60¢10%
Nos. 15 to 18 6@60¢10@70%
Nos. 19 to 22 60¢10@70%

Boxes, Axle—

Common and Concord, not turned lb. 4½@4¼c
Common and Concord, turned lb. 5@5½c
Half Patent lb. 9@9½c

Bait—Fishing—

Hendryx:
A Bait 30%
B Bait 25%
Competitor Bait 20&5%

Balances—Sash—

Caldwell new list 50%
Pullman's 60%

Spring—

Spring Balances 60@60&5%
Chatillon's:
Light Spg. Balances 40&10%
Straight Balances 40%
Circular Balances 50%
Large Dial 30%
Perlouze 50%

Barb Wire—See *Wire, Barb.*

Bars—Crow—

Steel Crowbars, 10 to 40 lb., per lb 3@3½c

Towel—

No. 10 Ideal, Nickel Plate ₱ gro, $8.50

Beams, Scale—

Scale Beams, List Jan. 12, '88 40¢10%
Chattillon's No. 1 30%
Chattillon's No. 2 40%

Beaters—Egg—

Lightning Chain, ₱ gro $15.00
National Mfg. Co.: ₱ gro.
No. 1 Dover, Family size $7.00
No. 2 Dover, Hotel size 14.00
Tapiin Mfg. Co.: ₱ gro.
No. 60 Improved Dover $6.00
No. 75 Improved Dover $6.50
No. 100 Improved Dover $7.00
No. 102 Improved Dover, Tin'd $8 50
No. 150 Improved Dover, Hotel $15.00
No. 152 Imp'd Dover, Hotel, T'd $17.00
No. 200 Imp'd Dover Tumbler $8 50
No. 202, Imp'd Dover Tumbler, Tin'd $9.50
No. 300, Imp'd Dover Mammoth, ₱ doz $25.00
Wonder (S. S. & Co.) ₱ gro. net, $6.00

Bellows—

Blacksmith, Standard List 75@75&5%

Blacksmiths'—

Inch..	*30*	*32*	*34*	*36*	*38*	*40*
Each	*$3.50*	*3.75*	*4.25*	*4.80*	*5.35*	*6.15*

Extra Length:
Each $4.00 4.55 5.10 5.60 6.40 7.50

Molders—

Inch	*10*	*12*	*14*
Doz	*$8.50*	*10.00*	*13.00*

Hand—

Inch	*6*	*7*	*8*	*9*	*10*
Doz	*$4.25*	*4.50*	*5.00*	*6.50*	*7.75*

Net Prices.

Bells—Cow—

Ordinary goods 75¢5@75¢10%
High grade 70¢10@70¢10¢5%
Jersey 75&10%
Texas Star 50%

Door—

Abbe' & Gong 45%
Barton Gong 55%
Home, R. & E. Mfg. Co.'s 55&10%
Lever and Pull, Sargent's 60&10&10%
Yankee Gong 55%

Hand—

Hand Bells, Polished, Brass 60&5@60¢10%
White Metal 55@55&10%
Nickel Plated 50@50¢5%
Swiss 60@60¢7½%
Cone's Globe Hand Bells 33⅓@33⅓&10%
Silver Chime 33⅓@33⅓&10%

Miscellaneous—

Farm Bells lb. 2@2½c
Steel Alloy Church and School 60@60¢5%
American Tube & Stamp'g Co. Gongs 75%
Table Call Bells 50&5&10%
Trip Gong Bells 55&10@60%

Belting—Rubber—

Agricultural (Low Grade) 75@75¢5%
Common Standard 70@70¢10%
Standard 65@70%
Extra 60¢5@60¢10%
High Grade 50¢5@50¢10%
Boston Belting Co.:
Seamless Stitched Imperial 45&5%
Boston 50&5%
Niagara 60&5%

Leather—

Extra Heavy, Short Lap 60@60¢5%
Regular Short Lap 60¢10@60¢10¢10%
Standard 70@70¢5%
Light Standard 70¢10%
Cut Leather Lacing 60¢10%
Leather Lacing Sides, per sq. ft. 18c

Bench Stops—See *Stops, Bench*

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender 40%
Green River Tire Benders and Upsetters 20%
Detroit Stoddard's Lightning Tire Upsetters, No. 1, $4.25; No. 2, $7.25; No. 3, $10.50; No. 4, $16.25; No. 5, $20.50.

Bicycle Goods—

John S. Leng's Son's 1902 list:
Chain 50%
Parts 50%
Spokes 50%
Tubes 60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See *Augers and Bits.*

Blocks—Tackle—

Common Wooden 70¢10@75¢5%
Hollow Steel Blocks, with Ford's Patent Sheaves 50&10%
Lane's Patent Automatic Lock and Junior 30%
Stowell's Novelty, Mal. Iron 50&10%
Stowell's Self Loading 60%
See also *Machines, Hoisting.*

Boards, Stove—

Zinc, Crystal, &c. 30¢10@40¢10%

Bolts—

Carriage, Machine, &c.—

Common Carriage 70¢10@70¢10&5%
Phila. Eagle, $3.00 list May 25, '99 80@80&5%
Bolt Ends, list Feb. 15, '95 65¢5@65¢10%
Machine, list Oct. 1, '99 70¢10@70¢10¢5%
Machine with C & T. Nuts 60¢10@...%

Door and Shutter—

Cast Iron Barrel, Round Brass Knob:

Inch	*3*	*4*	*5*	*6*	*8*
Per doz	*$0.26*	*.30*	*.39*	*.47*	*.65*

Cast Iron Spring Foot:

Inch	*6*	*8*	*10*
Per doz	*$1.00*	*1.25*	*1.75*

Cast Iron Chain, Flat, Japanned:

Inch	*6*	*8*	*10*
Per doz	*$0.75*	*1.05*	*1.30*

Cast Iron Shutter, Brass Knobs:

Inch	*6*	*8*	*10*
Per doz	*$0.57*	*.80*	*1.00*

Wrt Barrel, Jap'd 75¢10@75¢10¢10%
Wrought "L" Bronzed 40¢5@50¢10%
Wrought Flush, B. K. 50¢10@60¢10%
Wrought Shutter 40¢10¢10@60¢5%
Wrought Square Neck 50@50¢10%
Wrought Sunk, Flush 50@50¢10%
Ives' Patent Door 60%

Stove and Plow—

Plow 60@60¢6%
Stove 30@30¢10%

Tire—

Common 72½@72½¢10%
Norway Iron 50@50¢5%
American Screw Company:
Norway Phila., list Oct. 16, '84 80%
Eagle Phila. list Oct. 16, '84 82½%
Bay State, list Dec. 28, '99 72½%
Franklin Moore Co.:
Norway Phila., list Oct. 16, '84 80%
Eagle Phila., list Oct. 16, '84 82½%
Eclipse, list Dec. 28, '99 72½%
Russell, Burdsall & Ward Bolt & Nut Co.
Empire, list Dec. 28, '99 72½%
Norway Phila., list Oct. '84 80%
Upson Nut Co.:
Tire Bolts 72½%

Borers, Tap—

Borers Tap, Ring, with Handle:

Inch	*1¼*	*1½*	*1¾*	*2*
Per doz	*$4.50*	*5.00*	*5.75*	*7.25*
Inch			*2¼*	*2½*
Per Doz			*$8.65*	*11.50*

Enterprise Mfg. Co., No. 1, $1.25; No. 2, $1.65; No. 3, $2.50 each 35%

Boxes, Mitre—

C. E. Jennings & Co. 25&10%
Langdon 15&10%
Perfection ₱ doz. $6 00
Schatz 40%

Braces—

NOTE.—*Most Braces are sold at net prices.*
Common Ball, American $1.15@1.25
Barber's 50&10&10@60&10%
Fray's Genuine Spofford s 60%
Fray's No. 70 to 120, 81 to 133, 207 to 414 40%
C. E. Jennings & Co. 50&5&10%
Mayhew's Ratchet 10%
Mayhew's Quick Action Hay Patent 50%
Millers Falls Drill Braces 25&10%
P. S. & W. Co. Peck's Patent 60&10@65%

Brackets—

Wrought Steel 50@30¢5%
Bradley's Wire Shelf:
Full cases 85%
Broken cases 80&10&10%
Griffin's Pressed Steel 80%
Griffin's Folding Brackets 70&10%
Stowell's Cast Shelf 75%
Stowell's Sink 50%

Bright Wire Goods—See *Wire and Wire Goods.*

Broilers—

Wire Goods Co. 75@75&10%

Buckets, Well and Fire—See *Pails*

Bucks Saw—

Hoosier ₱ gro. $36.00

Bull Rings—See *Rings, Bull.*

Butts—Brass—

Wrought list Sept., '98 30@30¢10%
Cast Brass, Tiebout's 50%

Cast Iron—

Fast Joint, Broad 50@50¢10%
Fast Joint, Narrow 50@50¢10%
Loose Joint 70¢5@70¢10%
Loose Pin 70¢5@70¢10%
Mayer's Hinges 70&5@70¢10%
Parliament Butts 70¢5@70¢10%

Wrought Steel—

Table and Back Flaps 75%
Narrow and Broad 75%
Inside Blind 75&10%
Loose Pin 75%
Loose Pin, Ball and Steeple Tip 80¢20%
Japanned, Ball Tip Butts 70¢10%
Bronzed Wrt. Nar. and Inside Blind Butts 55¢10%

Extra 10@10¢10%

Cages, Bird—

Hendryx, Brass:
3000, 5000, 1100 series 5%
1200 series 33⅓&5
200, 300, 600 and 900 series 40&10%
Hendryx Bronze:
700, 800 series 40&10%
Hendryx Enameled 40&10%

Calipers—See *Compasses.*

Calks, Toe and Heel—

Blunt, 1 prong per lb. 4@4½¢
Sharp, 1 prong per lb. 4½@4¾¢
Perkins' Blunt Toe cents, ₱ lb .385
Perkins' Sharp Toe cents, ₱ lb .415

Can Openers—See *Openers, Can*

Cans, Milk—

	5	8	10 gal.	
Illinois Pattern.	$1 50	2.00	2.25	each.
Iowa Pattern	....	2.35	2.50	each.
	20	30	40	qts.
New York Patt'rn	1.65	2.40	2.75	each.
Baltimore Patt'rn	....	1.80	2.00	each.

Cans, Oil—

Buffalo Family Oil Cans:

3	5	10 gal.
$48.00	64.20	129.60 gro., net

Caps—Percussion—

Eley's E. B. 60c
G. D .....*per M* 2½@35c
F. .....*per M* 40@45c
G. E. .....*per M* 55@58c
Musket .....*per M* 62@63c

Primers—

Berdan Primers, $2.00 per M...20&5%
B. L. Caps (Sturtevant Shells) $2.00 per M 20%
All other primers per M.$1.52@$1.60

Cartridges—

Blank Cartridges:
32 C. F., $5.50 .....10c&5%
38 C. F., $7.00 .....10c&5%
22 cal. Rim, $1 50 .....10c&5%
32 cal. Rim, $2.75 .....10c&5%
B. B. Caps, Con., Ball Swgd $1.90
B. B. Caps, Round Ball $1.49
Central Fire 25%
Target and Sporting Rifle.....15c&5%
Primed Shells and Bullets.....15c&10%
Rim Fire Sporting 50%
Rim Fire, Military .....15c&5%

Cases, Show—

Sun, No. 102, Silent Salesman, 6 ft., $25.00

Casters—

Bed .....70@70c&10%
Plate .....60@60c&5%
Philadelphia .....75@75c&10%
Boss .....70c&10%
Boss Anti-Friction .....70c&10%
Martin's Patent (Phœnix) 35%
Smith & Hemenway Co. .....33⅓&5%
Standard Ball Bearing 45%
Tucker's Patent low list 30%

Cattle Leaders—

See *Leaders, Cattle.*

Chain, Coil—

American Coil, Jobbers' Shipments:

3-16	¼	5-16	⅜	7-16	½	9-16
8.50	5.50	4.40	4.00	3.80	3.70	3.65
⅝	¾	⅞	1 to 1¼ inch.			
3.60	3.55	3.50	3.40	per 100 lb.		

German Coil .....60c&10c&10%

Halters and Ties—

Halter Chains.....60c&10@60c&10c&10%
German Halter Chains, list July 24, '97 .....60c&10c&10@70c&10%
Cow Ties .....60@60c&10%

Trace, Wagon, &c.—

Traces, Western Standard: 100 pair
6½—6-3, Straight, with ring...$29.00
6½—6-2, Straight, with ring.. $30.50
6½—8-2, Straight, with ring.. $30.00
6½—10-2, Straight, with ring..$35.00
Add 2¢ per pair for Hooks.
Twist Traces 2¢ per pair higher than Straight Link.
Trace, Wagon and Fancy Chains.. 60@60c&10%

Miscellaneous—

Jack Chain, list July 10, '93:
Iron.....60c&10@60c&10c&10%
Brass.....60c&10@60c&10c&10%
Safety Chain.....70c&10@75c&5%
Gal. Pump Chain.....*lb.* 4½@4¾c
Covert Mfg. Co.
Breast .....40c&2%
Halter .....40c&2%
Heel .....40c&2%
Rein .....40c&2%
Stallion .....40c&2%
Covert Sad. Works:
Breast 70%
Halter 70%
Hold Back 70%
Rein 70%
Oneida Community:
Am. Coil and Halters.....40@40c&5%
Am. Cow Ties .....45c&50%
Eureka Coil and Halter.....45c&50&5%
Niagara Coil and Halters .....45c&50&5%
Niagara Cow Ties.....45&5&50&10&5%
Niagara Wire Dog Chains....45@50&5%
Wire Goods Co.:
Dog Chain .....70&10%
Universal Dbl-Jointed Chain.....50%

Chalk—(From Jobbers.)

Carpenters' Blue .....*gro.* 40c
Carpenters', Red .....*gro.* 35c
Carpenters', White .....*gro.* 30c
See also Crayons.

Checks, Door—

Bardsley's 45%
Columbia .....50&10%
Eclipse .....60&10%

Chests, Tool—

American Tool Chest Co.:
Boys' Chests, with Tools 55%
Youths' Chests, with Tools 40%
Gentlemens' Chests, with Tools.....30%
Farmers', Carpenters', etc., Chests, with Tools 30%
Machinists' and Pipe Fitters' Chests, Empty 50%
C. E. Jennings & Co.'s Machinists' Tool Chests .....33⅓&10%

Chisels—

Socket Framing and Firmer
Standard List .....70@70c&10%
Buck Bros 30%
Charles Buck 30%
C. E. Jennings & Co. Socket Firmer No. 10 .....60&10%
C. E. Jennings & Co. Socket Framing No. 15 .....60&10%
Swan's 70%
L. & I. J. White .....30@30&5%

Tanged—
Tanged Firmers .....40c&5@40c&10%
Buck Bros 30%
Charles Buck 30%
C. E. Jennings & Co. Nos. 191, 181 .....16⅔&10%
L. & I. J. White, Tanged .....25&5%

Cold—
Cold Chisels, good quality.lb. 13@15c
Cold Chisels, fair quality..lb. 11@12c
Cold Chisels, ordinary.....*lb. 9 @10c*

Chucks—

Beach Pat., each $8.00.. .....35&5%
Pratt's Positive Drive 25%
Empire 25%
Blacksmiths' 25%
Skinner Patent Chucks:
Combination Lathe Chucks.....40%
Drill Chucks, Patented Standard..30%
Drill Chucks, New Model 30%
Independent Lathe Chucks.....40%
Improved Planer Chucks.....25%
Universal Lathe Chucks.....40%
Face Plate Jaws.....40%
Standard Tool Co.:
Improved Drill Chuck 45%
Union Mfg. Co.:
Combination.....50%
Czar Drill 35%
Combination Geared Scroll.....40%
Geared Scroll 40%
Independent 50%
Independent Steel.....40%
Union Drill 45%
Universal.....50%
Independent Iron Face Plate Jaws..40%
Independent Steel Face Plate Jaws..40%
Westcott Patent Chucks:
Lathe Chucks.....50%
Little Giant Auxiliary Drill.....40%
Little Giant Double Grip Drill.....40%
Little Giant Drill, Improved 40%
Oneida Drill.....40%
Scroll Combination Lathe.....40%

Clamps—

Adjustable, Hammers'.....20@20&5%
Cabinet, Sargent's .....50&10%
Carriage Makers', P., S. & W. Co.....50%
Carriage Makers' Sargent's.....60%
Beam, Parallel.....33⅓&10%
Linemans' Utica Drop Forge & Tool Co40%
Saw Clamps, see *Vises, Saw Filers'.*

Cleaners, Drain—

Iwan's Champion, Adjustable.....55%
Iwan's Champion, Stationary.....40%

Sidewalk—

Star Socket, All Steel....₩ doz. $4.05 net
Star Shank, All Steel.... ₩ doz. $3.24 net
W. & C. Shank, All steel, ₩ doz., 7¼ in., $3.00; 8 in., $3.25.

Cleavers, Butchers'—

Foster Bros. 30%
New Haven Edge Tool Co.'s.....45%
Fayette R. Plumb.....33⅓@33⅓&10%
L. & I. J. White 30%

Clippers—

Chicago Flexible Shaft Company:
'93 Chicago Horse.....$8.75 } 15%
1902 Chicago Horse.....$10.75 }
20th Century Horse, each, $5.00 .....30%
Lightning Belt.....$15.00 }
Chicago Belt.....$30.00 } 15%
Stewart's Patent Sheep.....$18.50 }

Finger Nail Clippers—

Smith & Hemenway Co..... doz. net $2.00

Clips, Axle—

Eagle and Superior ¼ and 5-16 inch .....70c&10%
Norway, ¼ and 5-16 inch..70@70c&10%

Cloth and Netting, Wire —*See Wire, &c.*

Cocks, Brass—

Hardware list:
Compression and Plain Bibbs.....*65c&10@70%*
Globe, Kerosene, Racking, &c., Cocks.....*65c&5@70c&5%*

Coffee Mills—See *Mills, Coffee.*

Collars, Dog—

Brass, Walter B. Stevens & Son's list.40%
Embossed, Gilt, Walter B. Stevens & Son's list.....30&10%
Leather, Walter B. Stevens & Son's list40%

Combs, Curry—

Metal Stamping Co .....20&10%

Mane and Tail—

Covert's Saddlery Works.....60&10%

Compasses Dividers, &c.

Ordinary Goods.....*75c&5@75c&10%*
Bemis & Call Hdw. & Tool Co.:
Dividers.....65%
Calipers, Double.....65%
Calipers, Inside or Outside.....65%
Calipers, Wing.....60%
Compasses.....50%

Compressors, Corn Shock—

J. B. Hughes' ₩ doz. $2.50

Conductor Pipe, Calva.—

L. C. L. to Dealers:

Territory.	*Nested.*	*Not nested.*
A. Eastern.	*75c&2½%*	*75c&2½%*
B. Eastern	*75c&10&2½%*	*75c&2½%*
Central.	*75c&2½%*	*75%*
Southern	*70c&10%*	*70c&5%*
S. Western.	*70c&2½%*	*70c&2½%*

Terms, 60 days, 2% cash, 10 days. Factory shipments generally delivered.
See also *Eave Troughs.*

Coolers, Water—

Gal. each.	2	3	4	6	8
Labrador	$1.20	$1.50	$1.80	$2.10	2.70
Gal.	3	4	6	8	
Iceland, ea.	$1.80	$2.10	$2.40	$3.00	
Gal.	2	3	4	6	8
Galv. Lined Ea.	$1.85	$2.00	$2.25	$2.50	$3.90

25%

Galv. Lined side handles

Gal.	2	3	4	6	8
Each.	$1.95	$2.15	$2.40	$2.80	$4.15..25%

Coopers' Tools—

See *Tools, Coopers'.*

Cord—Sash—

Braided, Drab.....*lb.* 27@28c
Braided, White, Com..... *lb.* 21@23c
Cable Laid Italian..*lb. A, 18c; B, 16c*
Common India.....*lb.* 10@10½c
Cotton Sash Cord, Twisted....15@20c
Patent Russia.....*lb.* ..@14c
Cable Laid Russia.....*lb.* ..@15c
India Hemp, Braided.....*lb* ..@18c
India Hemp, Twisted.....*lb.* 12@13c
Patent India, Twisted.....*lb.*12@13c
Anniston Cordage Co.: Braided Cotton.
Old Glory, Nos. 7 to 12.....₩ lb 26 ¢
Anniston, Nos. 7 to 12 .....₩ lb 21 ¢
Old Colony, Nos. 7 to 12.....₩ lb 21 ¢
Anniston Drab, Nos. 7 to 12.....₩ lb 26 ¢
Pearl Braided, cotton, No. 6₩ lb. 22¢; Nos. 7 to 12. 21¢.
Eddystone Braided Cotton.....₩ lb 19¢
Harmony Cable Laid Italian.....₩ lb 18¢
Peerless:
Cable Laid Italian.....16¢
Cable Laid Russian.....14¢
Cable Laid India.....12¢
Braided India.....18¢
Samson, Nos. 7 to 12:
Braided, Drab Cotton .....₩ lb 32½¢
Braided, Italian Hemp.... ₩ lb 32½¢
Braided, Linen .....₩ lb 49¢
Braided, White Cotton, Spot.₩ lb 28½¢
No. 6 cords 1¢ extra.
Massachusetts, White .....₩ lb 24 ¢
Massachusetts, Drab.....₩ lb 28 ¢
Phœnix, White.....20¢
Silver Lake:
A quality, Drab, 40¢.....15¢
A quality, White, 35¢.....15¢
B quality, Drab, 35¢.....15¢
B quality, White, 30¢.....15¢
Italian Hemp, 40¢ .....15¢
Linen, 57½¢.....15¢

Wire, Picture—

List Oct., '00..... *85c&10@85c&10c&10%*

Cradles—

Grain.....*40c&12½%*

Crayons—

White Round Crayons, gross.5½@6c
Cases, 100 gro., $4.00, at factory.
D. M. Steward Mfg. Co.
Jumbo Crayons.....gr. $3.50 } Case lots 20%
Metal Workers' Crayons.gr. $2.50 }
Soapstone Pencils, round, flat or square.....gr.$1.50 }
Rolling Mill Crayons....gr. $2.50 }
Railroad Crayons (composition) gr. $2.00 }
See also *Chalk.*

Crooks, Shepherds'—

Fort Madison, Heavy .....₩ doz. $7.00
Fort Madison, Light.....₩ doz. $6.50

Crow Bars—See *Bars, Crow.*

Cultivators—

Victor Garden 50%

Cutlery, Table—

International Silver Company:
No. 12 Medium Knives, 1847...₩ doz. $3.50
Star, Eagle, Rogers & Hamilton and Anchor.....₩ doz. $3.00
Wm. Rogers & Son.....₩ doz. $2.50
Simeon L. & Geo. H. Rogers Company:
12 dwt. Medium Knives.....₩ doz. $3.00
No. 77 Medium Knives.....₩ doz. $2.50

Cutters—Glass—

H. H. Mayhew Co. 40%
Red Devil 50%
Smith & Hemenway Co. 50%
Woodward 40%

Meat and Food—

American 30%

Nos.	1	2	3	4	5	6
Each	$5	$7	$10	$25	$50	$60

Enterprise .....25@25&7½%

Nos.	5	10	12	22	32
Each	$2	$3	$2.75	$4.50	$6

Dixon's, ₩ doz. .....30c&10@40%

Nos.	1	2	3	4
	$14.00	$17.00	$19.00	$30.00

Ideal .....40&10@50%
Little Giant, ₩ doz. .....33⅓@40%

Nos.	305	310	312	320	322
	$35.00	$48.00	$44.00	$72.00	$68.00

N. E. Food Choppers 40%
New Triumph No. 605, ₩ doz. $24.00 .....30&10@40%
Ruswin Food No. 1, $24 00; No. 2, $27.00 .....45&10c&10%
Sterling .....40@40&10%
No 1....$2.00 each No. 2..$2.50 each
Woodruff's, ₩ doz .....30c&10@40%

Nos.	100	150
	$15.00	$18.00

Enterprise Beef Shavers..... ..25@30%

Slaw and Kraut—

Henry Disston & Sons:
Slaw, Corn Grater, &c 40%
Kraut Cutters 24 x 7, 26 x 8, 30 x 9.55%
Kraut Cutters 36 x 12, 40 x 12.....40%
J. M. Mast Mfg. Co.:
Slaw Cutters, 1 Knife.....₩ doz. $3.00
Combined Slaw Cutter and Corn Grater.....₩ doz. $4.00
Sterling $3.00 each.....33⅓%
Tucker & Dorsey Mfg. Co.:
Kraut Cutters 40%
Slaw Cutters, 1 Knife, ₩ gr....$18@$20
Slaw Cutters, 2 Knife, ₩ gr....$22@$36

Tobacco—

All Iron, Cheap.....*doz. $4.25@$4.50*
Enterprise.....25&5&5%
National, ₩ doz., No. 1, $21; No. 2, $18..40%
Sargent's, ₩ doz., No. 2.....60%
Sargent's No 12 and 21 .....50&10%

Washer—

Appleton's, ₩ doz. $16.00.....50&10&10%
Bonney's.....33⅓%

Diggers, Post Hole, &c.—

Dalbey Post Hole Auger...per doz., $9.00
Iwan's Improved Post Hole Auger.40&5%
Iwan's Vaughan Pattern Post Hole Augers, ₩ doz.....$6.50
Iwan's Perfection Post Hole Digger.. ₩ doz. $8.50
Iwan's Split Handle Post Hole Diggers, ₩ doz.....$7.50
Kohler's Universal..... ₩ doz. $15.00
Kohler's Little Giant.....₩ doz. $12.63
Kohler's Hercules.....₩ doz. $10.00
Kohler's Invincible.....₩ doz. $9 60
Kohler's Rival.....₩ doz. $8.51
Kohler's Pioneer.....₩ doz. $7.50
Never-Break Post Hole Diggers, ₩ doz. $24.00.....60%
Samson, ₩ doz. $34.00.....25%

Dividers—See *Compasses.*

Doors, Screen—

Phillips', style E, ¼ in.....₩ doz. $10.50
Phillips', style 077, ¼ in.....₩ doz. $8.00
Phillips', style x-y, ¼ in..... ₩ doz. $11.00
Porter's Plain, No. 8.....₩ doz. $6.75
Porter's Ornamental, No. 70. ₩ doz. $10.50
Porter's No. 99.....$9.00
Porter's No. 44.....$10.75

Drawers, Money—

Sun Money Drawers, No. 5, ₩ doz. $9.50; No. 6 with Bell, $10.50; No. 6, with Gong, $10.50.
Tucker's Pat. Alarm Till No. 1, ₩ doz. $18; No. 2, $15; No. 3, $12; No. 4 $18

Drawing Knives—

See *Knives, Drawing.*

Drills and Drill Stocks—

Common Blacksmiths' Drill...each $1.50@$1.75
Breast, Millers Falls .....15&10%
Breast, P., S. & W .....40&5%
Goodell Automatic Drills..40&5&40&10%
Johnson's Automatic Drills Nos. 2 and 3 .....16⅔&10%
Johnson's Drill Points.....16⅔&5&10%
Millers Falls Automatic Drills....33⅓&10%
Ratchet, Curtis & Curtis 25%
Ratchet, Parker's 40%
Ratchet, Weston's.....33⅓%
Ratchet, Whitney's, P. S. & W 50%
Whitney's Hand Drill, No. 1, $10.00:
Adjustable, No. 10, $12.00.....33⅓%

Twist Drills—

Bit Stock.....*60c&10@60c&10c&10%*
Taper and Straight Shank ..... *60c&10@60c&10c&5%*

Drivers, Screw—

Screw Driver Bits..per doz. ..45@75c
Balsey's Screw Holder and Driver, ₩ doz. 2-inch, $6; 4-in., $7.50 6-in., $9..40%
Buck Bros' Screw Driver Bits.....30%
Champion.....50%
Edson.....60%
Fray's Hol. H'dle Sets, No. 3, $12.00 50%
Gay's Double Action Ratchet.....35%
Goodell's Auto50&10&10@50&10&10&5%
Hurwood 40%
Mayhew's Black Handle.....50%
Mayhew's Monarch.....40&10%
Millers Falls, Nos. 20 and 21 .....25&10%
Millers Falls, Nos. 11, 12, 41 42.....15&10%
Never Turn.....60%
New England Specialty Co. 50%
Sargent & Co.'s:
Nos. 1 and 60.....50&10&10%
Nos. 50 and 55.....60&10%
Nos. 20 and 40.....70&10%
Smith & Hemenway Co .....40&5%
Stanley's R. & L. Co.'s:
No. 64, Varnished Handles30@60&10&10%
No. 86.....70@70&10&10%
Swan's:
Nos. 65 to 68.....50%
No. 10.....40&10%
Nos. 25, 35 and 45.....20&10&10%

Eave Trough, Galvanized

Territory.	*L. C. L.*
A. Eastern	*.80c&10%*
B. Eastern	*80c&10c&5%*
Central	*.80c&10%*
Southern	*75c&16⅔&5%*
S. Western	*75c&10c&5%*

Terms, 2% for cash. Factory shipments generally delivered.
See also *Conductor Pipe and Elbows.*

Elbows and Shoes—

Factory shipments.....60%
Perfect Elbows (S. S. & Co.)..... .....30%

Emery, Turkish—

	4 to 6	6½ to 150	Flour
Kegs	*lb. 5c*	*5½c*	*3¼c*
½ Kegs	*lb. 5½c*	*5¾c*	*3¼c*
Kegs	*lb 5c*	*6c*	
10-lb cans.10 in case 6½c		*7c*	*6c*
10-lb. cans, less than 10.10c		*10c*	*8c*

NOTE.—*In lots 1 to 3 tons a discount of 10% is given.*

Extractors, Lemon Juice —See *Squeezers, Lemon.*

Fasteners, Blind—

Zimmerman's .....50&10%
Walling's.....50%

Cord and Weight—

Ives 40%

Faucets—

Cork Lined.....*50@50c&10%*
*Metallic Key, Leather Lined*70@70c&10%
Red Cedar.....*40@40c&10%*
Petroleum.....*70c&10@75%*
B. & L. B. Co.:
Metal Key.....60&10%
Star 60%
West Lock.....50&10%
John Sommer's Peerless Tin Key.... 40%
John Sommer's Boss Tin Key.....50%
John Sommer's Victor Metal Key.50&10%
John Sommer's Duplex Metal Key....60%
John Sommer's Diamond Lock.....40%
John Sommer's I. X. L. Cork Lined..50%
John Sommer's Reliable Cork Lined 50&10%
John Sommer's Chicago Cork Lined..60%
John Sommer's O. K. Cork Lined.....50%
John Sommer's No Brand, Cedar.....50%
John Sommer's Perfection Cedar....40%
McKenna, Brass:
Burglar Proof, N. P.....35%
Improved, ¼ and ⅜ inch.....35%
Self Measuring:
Enterprise, ₩ doz. $36.00..... .40&10%
Lane's, ₩ doz. $36.00..... .40&10%
National Measuring, ₩ doz. $36..40&10%

Felloe Plates—

See *Plates, Felloe.*

Files—Domestic—

List revised Nov. 1, 1899.
Best Brands.....*70c&5@70c&10c&5%*
Standard Brands. 75c&5@75c&10c&10%
Second Quality.....*75c&10c&10@80c&5%*

Imported—

Stubs' Tapers, Stubs' list, July 24, '97 .....50%

Fixtures, Grindstone—

Net Prices:

Inch....	*15*	*17*	*19*	*21*	*24*
Per doz.	*$2.85*	*3.00*	*3.50*	*4.00*	*4.75*

P., S. & W. Co. .....30&10@10%
Reading Hardware Co. 60%
Sargent's .....60&10&10%
Stowell's Giant Grindstone Hanger, ₩ doz. $6.00
Stowell's Grindstone Fixtures, Extra Heavy.....50&10&10%
Stowell's Grindstone Fixtures Light.. 60&10%

Fodder Squeezers—

See *Compressors.*

Forks—

Base Discounts Aug. 1, 1899, list;
Hay, 2 tine .50&10@5%
Boys', & Fish, 2 tine .50&10@5%
Hay & Boys', 3 tine 60@5%
Hay & Boys', 4 tine 66⅔%
Champion Hay 66⅔%
Hay & Header, long 3 tine 65%
Header, 4 tine 65%
Barley, 4 & 5 tine, Steel .60&20%
Manure, 4 tine .60&15&2½%
Manure, 5 and 6 tine .66⅔&2½%
Spading .70&2½%
Potato Digger, 6 tine .60&10%
Sugar Beet .40&10%
Coke & Coal .40&10%
H-avy Mill & Street 65%
Iowa Dig-Ezy Potato .65%
Victor, Hay .60%
Victor, Manure .66⅔%
Victor, Header .66⅔%
Champion, Hay .66⅔%
Champion, Manure .60&20%
Columbia, Hay .66⅔&5%
Columbia, Manure .70%
Columbia, Spading .70&10%
Hawkeye Wood Barley 4 tine ₱ dos. $5.00; 6 tine, $6.00.
W. & C. Potato Digger .60&12½%
Acme Hay .60&10&5%
Acme Manure, 4 tine .60&20&7½%
Dakota Header .65&15&5%
Jackson Steel Barley .65&15&5%
Kansas Header .66⅔%
W. & C. Favorite Wood Barley 4 tine, ₱ doz., $5.00; 6 tine, $6.00
Plated. —See *Spoons.*

Fountains, Stock—

Double Dewey ₱ doz. $13.00

Frames— Saw—

White, Straight Bar, per doz. 75@80c
Red, Straight Bar, per doz $1.00@$1.25
Red, Double Brace, per doz. $1.50@1.50

Freezers Ice Cream—

Qts...	2	3	4	6	8	10
Best	$1.45	1 65	1.95	2.40	3.20	4.00
Good	$1 25	1.40	1.60	2.00	2.70	3.60
Fair	$1.00	1.10	1.30	1.75	2.30	2.95

Fruit and Jelly Presses—

See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Fuse— *Per 1000 Feet.*

Hemp Fuse $2.60
Cotton Fuse 2.90
Single Taped Fuse 3.25
Double Taped Fuse 4.20
Triple Taped Fuse 5.00
10&2½%

Gates, Molasses and Oil—

Stebbins' Pattern .30&5@30&10&5%

Gauges—

Marking, Mortise, &c. .50&10&5@50&10&10&5%
Chapin-Stephens Co.:
Marking, Mortise, etc. .50&10@50&10&10%
Scholl's Patent .50&10@50&10&10%
Door Hangers .50@50&10%
Fulton's Butt Gauge .20&10%
Stanley R. & L. Co.'s Butt & Rabbet Gauge .20@20&10&10%
Wire, Brown & Sharpe's .25%
Wire, Morse's .25%
Wire P., S. & W. Co .30&10%

Gimlets— Single Cut—

Nail, Metal, Assorted, gro. $1.40@1.80
Spike, Metal, Assorted gro. $2.80@3.50
Nail, Wood Handled, Assorted, gro. $1.75@2.00
Spike, Wood Handled, Assorted gro. $4.25@4.50

Glass, American Window

See *Trade Report.*

Glasses, Level—

Chapin-Stephens Co .60@60&10&10%

Glue—Liquid Fish—

Bottles or Cans, with Brush .25@50%
Cans (½ pts., pts., qts., ½ gal., gal.) .25@48%
International Glue Co. (Martin's) 40&10@50%

Grease, Axle—

Common Grade .gro. $4.50@5.50
Dixon's Everlasting, 10-lb pails, ea. 85¢
Dixon's Everlasting, in bxs., ₱ doz. 1 lb $1.20; 2 lb $2.00

Grips, Nipple—

Perfect Nipple Grips .40&10&2%

Griddles, Soapstone—

Pike Mfg. Co. .33⅓&33⅓&10%

Grindstones—

Bicycle Emery Grinder $6.50
Bicycle Grindstones, each $2.50@3.00
Pike Mfg. Co:
Improved Family Grindstones, per inch, per doz. $2.00
Pike Mower Knife and Tool Grinder, each. $5.00
25½%
Velox Ball Bearing, mounted, Angle Iron Frames each, $3.25

Halters and Ties—

Covert Mfg. Co.:
Web .45&2%
Jute Rope .40&5&5%
Sisal Rope .30&5%
Covert's Saddlery Works:
Web and Leather Halters .70%
Jute and Manila Rope Halters .70%
Sisal Rope Halters .60&20%
Jute, Manila and Cotton Rope Ties .70%
Sisal Rope Ties .60&10%

Hammers—Handled Hammers—

Heller's Machinists' .40&10@40&10&10%
Heller's Farriers .40&10@40&10&10%
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50, $1.75 40@40&10&10%
Peck, Stow & Wilcox .40&10&5%
Fayette R. Plumb:
Plumb, A. E. Nail .33½&7½@33½&10&7½%
Engineers' and B. S. Hand 50&7½&5@50&10&7½&5%
Machinists' Hammers 50&5@50&10&5%
Riveting and Tinners' 40&2½@40&10&2½%
Sargent's C. S. New List 40%

Heavy Hammers and Sledges—

Under 3 lb .lb. 50c
3 to 5 lb .lb. 40c
Over 5 lb .lb. 30c
75c&10@50 & 1%
Wilkinson's Smiths' .9½c@10c lb.

Handles—

Agricultural Tool Handles—

Axe, Pick, &c. .40&5%
Hoe, Rake, &c. .45@50&5%
Fork, Shovel, Spade, &c.:
Long Handles .45@50&5%
D Handles .40%

Cross-Cut Saw Handles—

Atkins' .40&5%
Champion .45@45&10%
Disston's .50%

Mechanics' Tool Handles—

Auger, assorted .gro $2.50@$2.75
Brad Awl .gro. $1.65@$1.85
Chisel Handles:
Apple Tanged Firmer, gro. ass'd. $2.40@$2.65
Hickory Tanged Firmer, gro. ass'd. $2 15@$2.40
Apple Socket Firmer, gro ass'd. $1.75@$1 95
Hickory Socket Firmer, gro ass'd. $1.45@$1.60
Hickory Socket Framing, gro. ass'd. $1.60@$1.75
File, assorted .gro. $1.30@$1.40
Hammer, Hatchet, Axe, &c. .50%
Hand Saw, Varnished, doz .80@85c
Not Varnished .65@75c
Plane Handles:
Jack, doz. 50c; Jack Bolted .75c
Fore, doz. .45c; *Fore, Bolted* .90c
Chapin-Stephens Co.:
Carving Tool .40@40&10%
Chisel .65@65&10%
File and Awl .65@65&10%
Saw and Plane .40@40&10%
Screw Driver .40@40&10%
Millers Falls Adj. and Ratchet Auger Handles .15&10%
Nicholson Simplicity File Handle, ₱ gro. $0.85@$1.50

Hangers—

Barn Door, New Pattern, Round Groove, Regular:

Inch	3	4	5	6	8
Single Doz.	$0.90	1.25	1.60	1.95	2.50

Barn Door, New England Pattern, Check Back, Regular:

Inch	3	4	5	6
Single Doz.	$1.30	1.85	2.50	3.00

Allith Mfg. Co.
Reliable No. 1 .per.doz. $12.00
Reliable No. 2 .per.doz. $15.00
Chicago Spring Butt Co.:
Friction .25%
Oscillating .25%
Big Twin .25%
Chisholm & Moore Mfg. Co.:
Baggage Car Door .50%
Elevator .30%
Railroad .50%
Cronk & Carrier Mfg. Co.:
Loose Axle .60%
Roller Bearing .60&10%
Lane Bros. Co.:
Parlor, Ball Bearing .$4.15
Parlor, Standard .$3.35
Parlor, New Model .$2.85
Parlor New Champion .$2.25
Barn Door, Standard .50&10&10&5%
Hinged .$6.40
Covered .50&10&10%
Special .50&10&10&5%
Lawrence Bros.:
Advance .60%
Cleveland .60&10%
Crown .60%
Giant .50&10%
New York .60%
Peerless .60&10%
Sterling .60%
Swing, No. 95 .60%
Union, No. 44, $5.00; No. 45 $7.00; No. 46, $8.00.
McKinney Mfg. Co.:
No. 1, Special, $15 .60&10%
No. 2, Standard, $18 .60&10%
Hinged Hangers, $10 .50%
Meyers' Stayon Hangers .60%
C. S. Smith Mfg. Co.:
Lundy Parlor Door .50&10%
Monarch Barn Door .60&10%
Never Jump Hinge .50&10%
Peerless .60&10%
Perfection .70&5%
Phœnix .70&5%
Wagner's Adjustable .70&10%
Warehouse Anti-Friction .60%
Richards Mfg. Co.:
Pioneer Wood Track No. 8 .$2.25
Imp'd Wood Track No. 5 .$2.25
Imp'd Steel Track No. 7 .$2.70
Imp'd Steel Track No. 7 .$3.65
Ball B'r'g Steel Track No. 9 .$2.50
Ball B'r'g Steel Track No. 10 .$2.50
Roller B'r'g Steel Track No. 11 .$3.45
Roller B'r'g Steel Track No. 12 .$2.40
Ball B'r'g Steel Track No. 13 .$2.75
Roller B'r'g Steel Track No. 14 .$2 65
Ball B'r'g Trolley Track No. 15 .40%
Ball Brg Trolley Track No. 19 .40&5%
Ball Bearing Tandem Trolley Track No. 16 .40%
Silent Adjustable Track No. 18 .40%
Auto Adjustable Track No. 22 .60%
Trolley B. D. No. 17 .$1.60
Trolley F. D. No. 120 .$2.70
Trolley F. D. No. 121 .$2.85
Trolley F. D. No. 151 .$3.00
Roller Bearing D. D. No. 25 .70&5%
Roller Bearing U. S. B. D. .70&5%
Anti Friction B. D. .60&10%
Ives' Wood Track No. 1 .$2.15
Ives' Imp'd Wood Track No. 2 .$2.15
Stowell Mfg. and Foundry Co.
Acme Parlor Ball Bearing .40%
Ajax Hinge Door .60%
Ajax Parlor Door .50&10&5%
Atlas .60%
Baggage Car Door .50%
Climax Anti-Friction .50&10%
Elevator .40%
Express .50%
Freight Car Door .60%
Interstate .40&10%
Lundy Parlor Door .50&10%
Magic .60%
Matchless .60&10%
Nansen .70&5%
Par or Door .50&10%
Railroad .50&10%
Rex Hanger Door .60%
Street Car Door .50%
Steel, Nos. 300, 404, 500 .50&10%
Underwriter's Fire Door .40%
Wild West Warehouse Door .50%
Zenith Car Wood Track .50&10%
A. L. Swett Iron Works:
Eagle .60&10%
Hylo .50&10%
Perfection .60%
Pilot .60%
Taylor & Boggis Foundry Co.'s Kidder's Roller Bearing .50&15&10&5%
Wilcox Mfg. Co.:
Bike Roller Bearing .60&10%
C. J. Roller Bearing .60&10%
Cycle Ball Bearing .50%
Dwarf Ball Bearing .40%
Ives, Wood Track .60&10%
L.T. Roller Bearing .60&10&5%
New Era Roller Bearing .50&10%
O. K. Roller Bearing .60&10&5%
Prindle, Wood Track .60%
Richards' Wood Track .60%
Richards' Steel Track .50&10%
Spencer Roller Bearing .60&10%
Tandem Nos. 1 and 2 .60%
Underwriters' Roller Bearing .40%
Velvet .50%
Wilcox Auditorium Ball Bearing .20%
Wilcox Barn Trolley No. 123 .40%
Wilcox Elv. Door, Nos 112 and 122½ .50%
Wilcox Elv. Door, No. 132 .40%
Wilcox Fire Trolley, Roller Bearing .30%
Wilcox Le Roy Noiseless Ball Bearing .40%
Wilcox New Century .50&10&10%
Wilcox O. K. Steel Track .50%
Wilcox O. K. Trolley .50%
Wilcox Trolley Ball Bearing .40%
Wilcox Wideman Narrow Gauge Ball Bearing .40%
For Track, see *Rail.*
Extra 5@10% often given.

Hangers, Gate—

Myers' Patent Gate Hangers, ₱ doz. net, $4.50

Hasps—

McKinney's Perfect Hasp, ₱ doz .50%

Hatchets—

Best Brands .50@50&10%
Cheaper Brands .60@60&10%
Note.—Net prices often made.

Heaters, Carriage—

Clark, No. 3, $2.25; No. 3D, $2.75; No 2s, $2.25; No. 1, $1.50 each 15%
Clark Coal, $0.75 ₱ doz 10%

Hinges—

Blind and Shutter Hinges—

Surface Gravity Locking Blind: (Victor; National; 1868 O. P. Niagara; Clark's O. P.; Clark's Tip; Buffalo.)

No.	1	3	5
Doz. pair	$0.85	1.75	3.50

Mortise Shutter: (L. & P., O. S., Dixie, &c.)

No.	1	1½	2	2½
Doz. pair	$0.70	.65	.60	.55

Mortise Reversible Shutter, (Buffalo, &c.)

No.	1	1½	2
Doz. pair	$0.75	.70	.65

North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50 10%
Parker 70&75%
Reading's Gravity .50&5%
Sargent's, Nos. 1, 3, 5, 11 & 13 70&10@75%
Stanley's Steel Gravity Blind Hinges, ₱ doz. sets, without screws, $0.80; with screws, $1.15. 70&10%
Wrightsville H'dware Co.:
O. S., Lull & Porter 7 &5%
Acme, Lull & Porter 75%
Queen City Reversible 75%
Stenger's Positive Locking, Nos. 1 & 3 70&10%
Shepard's Noiseless, Nos. 60, 65, 55 70&10%
Niagara, Gravity Locking, Nos. 1, 3 & 5 75%
1868, Old Pat'n, Nos. 1, 3 & 5 75%
Tip Pat'n, Nos. 1, 3& 5 75%
Buffalo Gravity Locking, Nos. 1, 3 & 5 75%
Shepard's Double Locking, Nos. 20 & 25 70%
Champion Gravity Locking, No. 75 .75%
Steamboat Gravity Locking, No. 10 .75%
Pioneer, Nos. 060, 45 & 5½ 75%
Empire, Nos. 101 & 103. 70%
W. H. Co.'s Mortise Gravity Locking, No. 2 60%
Extra 5@10% often given.

Gate Hinges—

Clark's or Shepard's—Doz. sets:

No.	1	2	3
Hinges with Latches	$1.00	2.70	5.00
Hinges only	$1.40	2.05	3.80
Latches only	.70	.70	.35

New England:
With Latch .doz .@$2.00
Without Latch .doz. .@$1.60
Reversible Self-Closing:
With Latch .doz. .@$1.75
Without Latch .doz. .@$1.35
Western:
With Latch .doz. $1.75
Without Latch .doz. $1.15
Wrightsville H'dware Co.:
Shepard's or Clark's, doz. sets,

No.	1	2	3
Hinges with Latches	$2.00	2.70	5.00
Hinges only	1.40	2.05	3.80
Latches only	.70	.70	1.35

Spring Hinges—

Holdback, Cast Iron gro. $9.00@10.00
Non-Holdback, Cast iron gro. $8.00@9.00
J. Bardsley
Bardsley's Non-Checking Mortise Floor Hinges 45%
Bardsley's Patent Checking 15%
Bommer Bros.:
Bommer Ball Bring Floor Hinges 40%
Bommer Spring Hinges 40%
Chicago Spring Butt Co.:
Chicago Spring Hinges 25%
Triple End Spring Hinges 50%
Chicago (Ball Bearing) Floor Hinge 50%
Garden City Engine House 25%
Keen's Saloon Door 25%
Columbian Hdw. Co.:
Acme, Wrt. Steel 30%
Acme, Brass 25%
American 30%
Columbia, No. 14 ₱ gr. $9.00
Columbia, No. 18 ₱ gr. $25.00
Columbia, Adjustable, No. 7 ₱ gr. $12.00
Gem, new list 30%
Clover Leaf ₱ gr. $12.50
Oxford, new list 30%
Lawson Mfg. Co.:
Matchless 35%
Matchless Pivot 45%
Shelby Spring Hinge Co:
Crown Jamb Hinge 40%
Chief Ball Bearing Floor Hinge 45%
Royal Ball Bearing Floor Hinge 45%
The Stover Mfg. Co.:
Ideal, No. 16, Detachable, ₱ gr $12.50
Ideal, No. 4 ₱ gr. $9.00
New Idea No. 1 ₱ gr. $9.00
New Idea, Double Acting 35%
Extra 10% often given on most of these Hinges. Ex 10@10&10%

Wrought Iron Hinges—

Strap and T Hinges, &c., list Mar. 15, 1901:
Light Strap Hinges .80&10%
Heavy Strap Hinges 80&20&10%
Light T Hinges .75&10&5%
Heavy T Hinges 75&5%
Extra Heavy T Hinges .80&20%
Hinge Hasps 70%
Cor. Heavy Strap .80&20&10%
Cor Ex. Heavy T .80&20%
Screw Hook and Strap. 6 to 12 in. lb. 3½c; 14 to 20 in lb. 3½c; 22 to 36 in lb. 3 c
Screw Hook and Eye:
⅜ to 1 inch .lb. 6 c
⅝-inch .lb. 7 c
½-inch .lb. 9 c

Hitchers, Stall—

Covert Mfg. Co., Stall Hitchers 35%

Hods, Coal—

	15	16	17	18 inch.
Galv. Open	$2.50	2.75	3.00	3.25 ₱ doz.
Jap. Open	$2.00	2.25	2.50	2.75 ₱ doz.
Galv. Funnel	$3.00	3.25	3.50	3.75 ₱ doz.
Jap. Funnel	$2.50	2.75	3.00	3.25 ₱ doz.

Hooks, Etc.—

Cleveland Wire Spring Co.:
Steel Mortar each $1.45
Steel Brick each $1.10

Hoes— Eye—

Scovil and Oval Pattern 60&10@60&10&10%
Grub, list Feb. 23, 1899 60&10&10@70%
D. & H. Scovil 35%

Handled—

Aug. 1, 1899, List:
Field and Garden .70&10%
Smith's Patent 50%
Meadow & Rhode Island 75%
Black Diamond 70&10%
Mortar and Street .70&10&10%
Planters' 75&12½%
Cotton .70&10&10%
Cotton Chopper 75&12½%
Weeding Hoes 66⅔&15%
Steel Weeders 66⅔&15%
Malleable Weeders 66⅔&15%
Ft. Madison Cotton Hoe .75&7½%
Ft. Madison Crescent Cultivator Hoe, per doz 75&10%
Ft. Madison Mattock Hoes:
Regular Weight ₱ doz. $5.00
Junior Size ₱ doz. $4.00
Ft. Madison Sprouting Hoe, ₱ doz. $4 80
Ft. Madison Dixie Tobacco Hoe .75&20%
Kretsinger's Cut Easy .70&10%
Warren Hoe .55%
W. & C. Ivanhoe .75&2%
B. B. 6 in., Cultivator Hoe $3.15
B. B., 6½ in. $3.85
Acme Weeding ₱ doz., net, $4.35
W. & C. Lightning Shuffle Hoe, ₱ doz. $4.85

Hoisting Apparatus—

See *Machines, Hoisting.*

Holders— Bit—

Angular, ₱ doz. $24.00 45&10%

Door—

Empire .50%
Bardsley's .45%

File and Tool—

Nicholson File Holders and File Handles .33⅓&10%

Hooks— Cast Iron—

Bird Cage, Reading .50&10%
Bird Cage, Sargent's List .60%
Ceiling, Sargent's List .50&10%
Clothes Line, Reading List .50%
Clothes Line, Sargent's List .50&20&10%
Coat and Hat, Sargent's List .50@50&10%
Clothes Line, Stowell's .70%
Coat and Hat, Reading .50%
Coat and Hat, Stowell's .70%
Coat and Hat, Wrightsville .65%
Harness, Reading List .50&10%
Harness, Stowell's .60%
School House, Stowell's .70%

Wire—

Belt .80&10%
Wire C. & H. Hooks .70@70&10&5%
Atlas, Coat and Hat:
Single Cases .70%
10 Case Lots .70&10%
Columbian Hdw Co. Gem .60&10%
Parker Wire Goods Co.: King .70&10%

Wire Goods Co:
Acme ..... 60&10%
Chief 70%
Crown ..... 70&10%
Czar 65%
V Brace ..... 70&10%
Czar Harness ..... 50&10%

Wrought Iron—
Box, 6 in., per doz. $1.00; 8 in., $1.25; 10 in., $2.50.
Cotton ..... doz. $1.05@1.25
Wrought Staples, Hooks, &c.—
See *Wrought Goods.*

Miscellaneous—
Bush, Light, doz. $5.50; Medium, $6.00; Heavy, $6.50
Grass .....Nos. 1 2 3 4
Best $1.50 1.75 2.00
Common .. $1.30 1.50 1.60 1.60
Potato and Manure ..... 60&15%
Wh Bletres ..... lb. 5¾@6c
Hooks and Eyes:
Brass ..... 60&10&10@70%
Malleable Iron ..... 70&5@70&10%
Covert Saddlery Works' Self Locking Gate and Door Hook 60%
Ft. Madison Cut-Easy Corn Hooks, ₩ doz. $5.25 net
Bench Hooks—See *Bench Stops.*
Corn Hooks—See *Knives, Corn.*

Horse Nails—See *Nails, Horse*

Horseshoes—
See *Shoes, Horse.*

Hose Rubber—
Garden Hose, ¾ inch:
Competition ..... ft. 4½@5 c
3-ply Standard ..... ft. 6½@7 c
4-ply Standard ..... ft. 7½@8 c
3-ply extra ..... ft. 8½@9 c
4-ply extra ..... ft. 10 @10½c
Cotton Garden, ¾-in., coupled:
Low Grade ..... ft. 6 @7 c
Fair quality ..... ft. 8 @9 c

Irons—Sad—
From 4 to 10 ..... lb 3@4¼c
B. B. Sad Irons ..... lb. 3¼@3½c
Chinese Laundry ..... lb. 4¼@5c
Chinese Sad ..... lb. 4@4¼c
Mrs. Potts', per set:
Nos 50 55 60 65
JapdTops 71 68 81 78
TinnTops 74 71 84 81
New England Pressing, lb .. 3½@4c

Pinking—
Pinking Irons ..... doz. 50@60c

Soldering—
Soldering Coppers 2½ and 3 .. 19@20c
1½ and 2 ..... 21@22c

Jacks, Wagon—
Covert Mfg. Co.:
Auto Screw ..... 30&5%
Steel ..... 45&2%
Covert's Saddlery Works':
Daisy ..... 60&10%
Victor ..... 60&10%
Lockport 50%
Lane's Steel ..... 30&10%

Kettles—
Brass, Spun, Plain ..... 20@25%
Enameled and Cast Iron—See *Ware, Hollow.*

Knives—
Butcher, Kitchen, &c.—
Foster Bros.' Butcher, &c 30%
Smith & Hemenway Co ..... 40&10%
Wilkinson Shear & Cutlery Co, ... 50%
Hay and Straw—See *Hay Knives.*

Corn—
Withington Acme, ₩ doz., $2.65; Dent, $2.75; Adj. Serrated, $2.20; Serrated, $2.10; Yankee No. 1, $1.50; Yankee No. 2, $1.15.

Drawing—
Standard List ..... 70&5@70&10%
Bradley's 35%
C. E. Jennings & Co. Nos. 45, 46 .60&10%
Jennings & Griffin, Nos. 51, 52 .60&10&10%
Swan's ..... 70&10&2½%
Watrous ..... 10%&10%
L. & I. J. White ..... 20&5@25%

Hay and Straw—
Lightning ..... ₩ doz. $6.50@7.00
Iwan's Sickle Edge ..... ₩ doz. $10.00
Iwan's Serrated ..... ₩ doz. $10.00
Maine ..... ₩ doz. $8.50

Mincing—
Buffalo ..... ₩ gro. $13.00

Miscellaneous—
Earriers' ..... doz. $3.00@3.25
Wostenholm's ..... ₩ doz. $3.00@3.25

Knobs—
Base, 2½ inch, Birch, or Maple, Rubber tip, gro ..... $1.10@1.15
Carriage, Jap, all sizes .. gro. 40@45c
Door, Mineral ..... doz. 65@70c
Door, Por. Jap'd ..... doz. 70@75c
Door, Por. Nickel ..... doz. $2.05@2.15
Bardsley's Wood Door, Shutter, &c .. 15%
Picture, Sargent's ..... 60&10&10%

Lacing Leather—
See *Belting Leather—*

Ladders, Step, Etc.—
Lane's Store 25%
Myers Noiseless Store Ladders 50%

Ladies' Melting—
L. & G. Mfg. Co, Low List 25%
P. S. & W 50%
Reading 60%
Sargent's ..... 45&10%

Lanterns—Tubular—
Regular Tubular No. 0. doz. $4.35@4.75
Lift Tubular .. No. 0 .. doz. $4.75@5.25
Hinge Tubular, No. 0 .. doz. $4.75@5.25
Other Styles ..... 40&10@40&10&5%

Bull's Eye Police—
No. 1, 2¾ inch ..... $2.50@2.75
No. 2, 3 inch ..... $2.75@3.00

Lasts and Stands, Shoe—
Stowell's Atlas, Mallable Iron 50%
Stowell's Badger, Cast Iron 60%

Latches—
Thumb—
Roggin's Latches, with screw, dz 35@40c

Leaders, Cattle—
Small ..... doz. 55c; large, 60c
Covert Mfg. Co ..... 45&2%

Lifters, Transom—
R. & E. 33½%

Lines—
Wire Clothes, Nos ... 18 19 20
100 feet $2.20 2.00 1.65
75 feet $1.80 1.70 1.30
Samson Cordage Works:
Solid Braided Chalk, No. 0 to 3 ..... 40%
Silver Lake Braided Chalk, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₩ gr 30%
Anniston Waterproof Clothes, 50 ft., ₩ gro.: $24.00; Gilt Edge, $22.00; Air Line, $23.00; Acme, $17.00; Alabama, $16.00; Empire, $17.00; Advance, $14.00; Alliston, $13.00; Calhoun, $11.00; Oriole, $20.00; Albermarle, $13.50; Eclipse, $12.50; Chicago, $11.00; Standard, $10.00; Columbia, $9.00.

Locks—Cabinet—
Cabinet Locks ..... 33½@33½&7½%

Door Locks, Latches, &c.—
[Net prices are very often made on these goods.]
Reading Hardware Co 50%
R. & E. Mfg. Co 40%
Sargent & Co ..... 40&10%
Stowell's Steel Door Latches 50%

Elevator—
Stowell's 50%

Padlocks—
Wrought Iron ..... 75&10&5@80&5%
R. & E. Mfg. Co. Wrt. Steel and Brass ..... 75@75&10%

Sash, &c.—
Ives' Patent.:
Bronze and Brass 62½%
Crescent 50%
Iron 62½%
Wrought Bronze and Brass 55%
Wrought Steel 55%
Reading ..... net 50%

Machines—Boring—
Com., Upright, Without Augers .. $2.00
Com., Angular, Without Augers .. $2.25
Without Augers.

R. & E. Mfg. Co.:	Upright.	Angular.
Improved No. 3	$4.25	No. 1 $5.00
Improved No. 4	3.75	No. 2 3.38
Improved No. 5	2.75	
Jennings'	No. 0, 3.15	No. 1, 3.50
Millers' Falls		5.75
Snell's, Rice's Pat.	2.50	2.75

Corking—
Reisinger Invincible Hand Power ..... ₩ doz. $48.00

Fence—
Williams' Fence Machines ..... each, $5.50

Hoisting—
Moore's Anti-Friction Differential Pulley Block 30%
Moore's Hand Hoist, with Lock Brake .. 20%

Ice Cutting—
Chandler's ..... 15&10%

Washing—
Boss Washing Machine Co.:	Per doz.
Boss No. 1; Boss Rotary	$57.00
Boss No. 7; Dietz Rotary	60.00
Champion Rotary; Banner No. 1	54.00
Standard Champion No. 1	48.00
Standard Perfection	36.00
Cinti Square Western	30.00
Uneeda American, Round	29.00

Mallets—
Hickory ..... 45&5@50%
Lignumvitæ ..... 45&5@50%
Tinners', Hickory and Applewood, doz ..... 50@55c

Mats—Door—
Elastic Steel (W. G. Co.) 10%

Mattocks—
See *Picks and Mattocks.*

Milk Cans—See *Cans, Milk*

Mills—Coffee, etc.—
Enterprise Mfg. Co ..... 25@30%
National, list Jan. 1, 1902 ..... 30%
Parker's Columbia & Victoria .. 50&10@60%
Parker's Box and Side ..... 50&10@60%
Sun, No. 1080, 1 lb mill ..... ₩ doz $3.00
Swift, Lane Bros Co 30%

Mowers, Lawn—
Net prices are generally quoted.
Cheap ..... all sizes. $1.90@1.95
Good ..... all sizes, $2.25@2.50

	10	12	14	16-inch
High Grade	4.25	4.50	4.75	5.00

Continental ..... 60&5%
Great American 70%
Great American Ball Bearing, new list .. 70%
Quaker City 70%
Pennsylvania ..... 60&5%
Pennsylvania, Jr., Ball Bearing 60%
Pennsylvania Golf 50%
Pennsylvania Horse ..... 33½&5%
Pennsylvania Pony ..... 40&5%
Philadelphia:
Styles M., S., C., K. T ..... 70&5%
Style A, all Steel ..... 60&5%
Style E, High Wheel ..... 70&10&5%
Drexel and Gold Coin, low list .. 40&5%

Nails—
Cut and Wire. See Trade Report.
Wire Nails and Brads, Papered. List July 20, 1899 ..... 85@85&10%
Hungarian, Finishing, Upholsterers', &c. See Tacks.

Horse—

Nos.	6	7	8	9	10	
A. C	25	23	23	21	21	40&5%
Ausable	28	26	25	24	23	50&10%
C. B. K	25	23	22	21	21	40%
Champ'n	28	26	25	24	23	50%
Clinton	19	17	16	15	14	30&10&5%
Maud S	25	23	22	21	21	50%
Putnam	23	21	20	19	18	33½%
New "	19	18	17	16	16	10&10%

American, Nos. 5 to 10, ₩ lb ..... 9@9½c
Jobbers' special brands, per lb. 8@8½c

Picture—

	1½	2	2½	3	3½ in.
Brass Head	.45	.60	.70	.95	1.00 gro.
Por. Head	..	1.10	1.10	1.10	.. gro.

Nippers, See *Pliers and Nippers.*

Nuts—
Cold Punched: Off list.
Mfrs. or U. S. Standard.
Square, plain ..... $4.90@5.00
Hexagon, plain ..... $5.20@5.30
Square, C. T. & R ..... $5.10@5.20
Hexagon, C. T. & R ..... $5.70@4.80
Hot Pressed:
Mfrs., U. S. or Nar. Gauge Stan'd.
Square Blank ..... $5.80@5.90
Hexagon Blank ..... $6.40@6.50
Square Tapped ..... $5.60@5 70
Hexagon Tapped ..... $6.20@6 50

Oakum—
Best or Government ..... lb. 6¼c
Navy ..... lb. 4¼c
U. S. Navy ..... lb. 5¼c
Plumbers' Spun Oakum 8¾c
In carload lots ¼c lb. off f. o. b. New York.

Oil Tanks—See *Tanks, Oil.*

Oilers—
Brass and Copper ..... 60&10%
Tin or Steel ..... 70&10@75&10%
Zinc ..... 65&10%
Chase or Paragon:
Brass and Copper ..... 45&10@50%
Tin or Steel ..... 75@75&10%
Zinc ..... 66@60&10%
Malleable, Hammers' Improved, No. 1, $3.60; No. 2, $4; No. 3, $4.40 ₩ doz. 20% same list ..... 50&10%
American Tube & Stamping Co.:
Spring Bottom Cans ..... 70@70&10%
Railroad Oilers etc ..... 60@60&10%

Openers—Can—
French ..... doz. 55c
Iron Handle ..... doz. 25@27c
Sprague, Iron Hdle., per doz. 35@40c
Sardine Scissors .. doz. $1.75@$3.00
Marvel ..... per doz. $1.25
National 50%
Stowell's Sprague ..... per doz. 35@45c
Tip Top ..... per doz. $0.75
Triumph Shear ..... ₩ gro. $9.00

Egg—
Nickel Plate ..... per doz., $3.00
Silver Plate ..... per doz., $4.00

Packing—
Asbestos Packing, Wick and Rope, 14½@15c lb.

Rubber—
Sheet, C. I ..... 8@10c
Sheet, C. O. S ..... 9@13c
Sheet, C. B. S ..... 10@14c
Sheet, Pure Gum ..... 50@65c
Sheet, Red ..... 40@50c
Jenkins' Standard, ₩ lb 80c .. 25@25&5%

Miscellaneous—
American Packing ..... 7@10c lb.
Cotton Packing ..... 16@20c lb.
Italian Packing ..... 9@12½c lb.
Jute ..... 4@4½c lb.
Russia Packing ..... 8@11c lb.

Pails—Creamery
S. S. & Co., with gauges.. No 1 $6.25; No. 2, $6.50 ₩ doz.

Galvanized—
Price per doz.

	Quart	10	12	14
Water, Regular	..	1.50	1.75	2.00
Water, Heavy	....	2.75	3.00	3.25
Fire, Rd. Bottom	.	2.30	2.60	2.80
Well	.	2.25	2.50	2.75

Pans—Dripping—
Standard List ..... 60&10@60&10&5%

Fry—
Common Lipped:

No.	1	2	3	4	5
Per doz.	$0.95	1.05	1.15	1.30	1.85

Roasting and Baking—
Regal, S. S. & Co., ₩ doz., Nos. 5, $4.50; 10 $5.25; 20, $5.75; 30, $6.25.
Savory, ₩ doz., net, Nos. 300, $9.00; 400, $15 00.
Simplex, ₩ gro.:

No.	40	50	60	140	150	160
	$30.00	35.00	42.00	31.00	39.00	46.00

Paper—Building Paper—
Asbestos: *lb.*
Building Felt 2¾c
Mill Board, sheet, 40 x 40 inches 2½c
Mill Board, roll, thicker than 1-16 inch 3½c
Mill Board, roll, 1-16 in. thick and less 2½c

Per roll
Rosin Sized Sheathing: 500 sq. ft.
Light wt., 25 lbs. to roll ..... $0.40@0.45
Medium wt., 30 lbs. to roll .. $0.45@0.50
Heavy wt., 40 lbs. to roll .. $0.65@0.70
Black Water Proof Sheathing, 500 Sq. ft., 1 ply, 6c; 2 ply, 85c; 3 ply, $1.10; 4 ply, $1.25.
Deafening Felt, 9, 6 and 4½ sq. ft. to lb., ton $41.00
Red Rope Roofing, 250 sq. feet per roll $1.75
NOTE.—*These goods are often sold at delivered prices.*

Tarred Paper.
1 ply (roll 200 sq. ft.), ton .. $32.50@35.50
2 ply, roll 108 sq. ft ..... 55@60c
3 ply, roll 108 sq. ft ..... 78@80c
Slater's Felt (roll 500 sq. ft.) 75c
NOTE.—*Above prices often include delivery.*
R. R. M. Stone Surfaced Roofing (roll 110 sq. ft.) $2.75

Sand and Emery—
Flint Paper and Cloth .. 50&10@60%
Garnet Paper and Cloth 25%
Emery Paper and Cloth 25%

Parers—Apple—
Advance ..... ₩ doz. $4.50
Baldwin ..... ₩ doz. $5.00
Bonanza Improved ..... each $6.50
Dandy ..... each $7.50
Eureka Improved ..... each $20.00
Family Bay State ..... ₩ doz. $15.00
Improved Bay State ..... ₩ doz. $36.00
New Lightning ..... ₩ doz. $7.50
Reading 72 ..... ₩ doz. $4.00
Reading 78 ..... ₩ doz. $7.00
Turn Table '98 ..... ₩ doz. $6.75
White Mountain ..... ₩ doz. $6.00

Potato—
Saratoga ..... ₩ doz. $7.00
White Mountain ..... ₩ doz. $6 00

Picks and Mattocks—
List Feb. 23, 1899 .. 60&10@60&10&10%

Pinking Irons—
See *Irons, Pinking.*

Pins—Escutcheon—
Brass ..... 60@60&10%
Iron, list Nov. 11, '85 ..... 60@60&10%

Pipe, Cast Iron Soil—
Standard, 2-6 in ..... 50&10%
Extra Heavy, 2-6 in 65%
Fittings 70%

Pipe, Merchant,
Steel or Iron, Carload Lots,

	f. o. b. Pittsburgh.	*Black.*	*Galvanized.*
Merchant Pipe.			
⅛, ¼, ⅜ inch		68%	58%
½ inch		70%	60%
¾ to 6 inch		75%	65%
7 to 12 inch		69%	59%

Pipe, Sewer—
Jobbers' Prices—
Standard Pipe and Fittings, 2 to 24 in.
New England 67%
New York and New Jersey 70%
Maryland, Delaware, East Penn. 72%
West Penn and West Va 73%
Virginia 75%
Ohio, Michigan and Ky 75%
Indiana 77%
Carload lots are generally delivered.

Pipe, Stove—
Edwards' Nested Stove Pipe:

	C. L.	L. C. L.
5 in., per 100 joints	$7.50	$8 50
6 in., per 100 joints	8.00	9.00
7 in., per 100 joints	9.00	10.00

Planes and Plane Irons—
Wood Planes—
Bench, First quality .. 40&5@40&10%
Bench, Second qual .. 60&5@50&10%
Molding ..... 33½&5@33½&10%
Bailey's (Stanley R. & L. Co) 5&10@25&10&10%
Chapin-Stephens Co.:
Bench, First Quality ..... 40@40&10%
Bench, Second Quality ..... 50@50&10%
Molding ..... 33½@33½&10%
Toy and German ..... 40@40&10%
Gage Self Setting 35%
Union 60%

Iron Planes—
Bailey's (Stanley R. & L. Co) ..... 25&10@25&10&10%
Chaplin's Iron Planes ..... 50&10%
Miscellaneous Planes (Stanley R. & L. Co.) ..... 20&10@20&10&10%
Sargent's ..... 60@60&10%
Union 60%

Plane Irons—
Wood Bench Plane Irons ..... 30&5@30&10%
Buck Bros 30%
Chapin-Stephens Co ..... 30@30&10%
Stanley R. & L. Co .. 20&10@20&10&10%
L. & I. J. White ..... 20&5@25%

Planters, Corn, Hand.
Kohler's Eclipse ..... ₩ doz. $8.50

Plates—
Felloe ..... lb. 3½@4c
Self-Sealing Pie Plates (S. S. & Co.), ₩ doz. $2.00 ..... 50%

Pliers and Nippers—
Button Pliers ..... 75@75&10%
Gas Burner, per doz., 5 in., $1.25@ $1.30; 6 in., $1.45@$1.50
Gas Pipe .. 7 8 10 12-in.
$2.00 $2.25 $3.00 $3.75
Acme Nippers ..... 50@50&5%
Bernard's:
Cutting Nippers 33½%
Parallel, Pliers 33½%
Paragon Pliers 50%
Lodi Pliers 50%
Elm City Fence Pliers 33½%
Cronk & Carrier Mfg. Co.:
American Button ..... 75&10%
Cronk's 60%
Improved Button ..... 70&10%
Stub's Pattern 50%
Combination and others 33½%
Heller's Farriers' Nippers, Pincers, and Tools 40&10@40&10&10%
P., S. & W. Tinners' Cutting Nippers, 30@30&10%
Swedish Side, End and Diagonal Cutting Pliers 50%
Utica Drop Forge & Tool Co.:
Pliers and Nippers, all kinds 40%

Plumbs and Levels—
Chapin Stephens Co.:
Plumbs and Levels ..... 30@30&10&10%
Chapin's Imp. Brass Cor ..... 40@40&10&10%
Pocket Levels ..... 30@30&10&10%
Level Glasses ..... 60@60&10&10%
Disston's Plumbs and Levels 50%
Disston's Pocket Levels 50%
C. E. Jennings & Co.'s Iron ..... 25&10%
C. E. Jennings & Co.'s Iron, Adjustable. 33½&10%
Stanley R. & L. Co ..... 30&10@30&10&10%

Stanley's Duplex.....20@20&10@10%
Woods' Extension.....33⅓%

Poachers, Egg—

Buffalo Steam Egg Poachers, ₱ doz. No. 1, $4.00; No. 2, $5.00; No. 3, $6.00; No. 4, $12.00.....50%

Points, Glaziers'—

Bulk and 1 lb. papers.. *lb.* 8¼c@8¾c
½-lb. papers.....*lb.* 8¾c@9 c
¼-lb. papers.....*lb.* 9 c@9¼c

Pokes, Animal—

Ft. Madison Hawkeye.....₱ doz. $3.25
Ft. Madison Western.....₱ doz. $4.00

Police Goods—

Manufacturers' Lists.....25@25&5%
Tower's.....25%

Polish—Metal—

Prestoline Liquid, No. 1 (¼ pt.), ₱ doz. $3.00; No. 2 (1 qt.), $9.72.....40%
Prestoline Paste.....40&10%
George William Hoffman:
U. S. Metal Polish Paste, 3 oz. boxes, ₱ doz. 50¢; ₱ gr. $4.50; ½ lb boxes, ₱ doz. $1.35; 1 lb boxes, ₱ doz. $2.25.
U. S. Liquid, 8 oz. cans, ₱ doz. $1.25; ₱ gr. $12.00.
Barkeepers' Friend Metal Polish, ₱ doz. $1.75; ₱ gr. $18.00.
Wynn's White Silk, ½ pt. cans, ₱ doz.....$2.00

Stove—

Black Eagle Benzine Paste, 5 lb cans, ₱ lb 10¢
Black Eagle, Liquid, ½ pt. cans ₱ doz. 75¢
Black Jack Paste, ¼ lb cans, ₱ gro. $9.00
Black Kid Paste, ½ lb can.....each, $0.65
Ladd's Black Beauty, gr. $10.00.....50%
Joseph Dixon's, ₱ gr. $5.75.....10%
Dixon's Plumbago.....₱ lb 8¢
Fireside.....₱ gr. $2.50
Gem, ₱ gr. $4.50.....10%
Japanese.....₱ gr. $3.50
Jet Black.....₱ gr. $3.50
Peerless Iron Enamel, 10 oz. cans.....₱ doz. $1.50
Wynn's:
Black Silk, 5 lb pail.....each 70¢
Black Silk, ½ lb box.....₱ doz. $1.00
Black Silk, 5 oz. box.....₱ doz. $0.75
Black Silk, ½ pt. liq.....₱ doz. $1.00

Poppers, Corn—

1 qt., Square.....*gro. $9.00*
1 qt., Round.....*gro. $10.00*
1½ qt. Square.....*gro. 11.00*
2 qt., Square.....*gro. 13.00*

Post Hole and Tree Augers and Diggers—

See also *Diggers, Post Hole, &c.*

Posts, Steel—

Steel Fence Posts, each, 5 ft., 42¢; 6 ft., 46¢; 6½ ft., 48¢.
Steel Hitching Posts, each.....$1.30

Potato Parers—

See *Parers, Potato.*

Pots— Glue—

Enameled.....40%
Tinned.....35%

Powder—

In Canisters:
Duck, 1 lb. each.....45¢
Fine Sporting, 1 lb. each.....75¢
Rifle, ½-lb. each.....15¢
Rifle, 1-lb. each.....25¢
King's Semi-Smokeless:
Keg (25 lb bulk).....$6.50
Half Keg (12½ lb bulk).....3.50
Quarter Keg (6¼ lb bulk).....1.90
Case 24 (1 lb cans bulk).....8.50
Half case (1 lb cans bulk).....4 50

King's Smokeless:	Shot Gun	Rifle
Keg (25 lb bulk).....	$12 00	$15.00
Half Keg (12½ lb bulk)	6.25	7.75
Quarter Keg (6¼ lb bulk)	3.25	4.00
Case 24 (1 lb cans bulk)	14.00	17 00
Half case 12 (1 lb cans blk)	7.25	8 75

Robin Hood smokeless Shot Gun..50&20%

Presses—Fruit and Jelly—

Enterprise Mfg. Co.....20@25%
Sensible.....33⅓%
2 qt., $2.00; 4 qt., $4.00; 10 qt., $6.00 each.

Seal Presses—

Morrill's No. 1, per doz. $20.00.....50%

Pruning Hooks and Shears—See *Shears.*

Pullers, Nail—

Cyclops.....50%
Dudly Improved Nail Puller.....50%
Miller's Falls, No. 3, per doz. $12.00.....33⅓&10%
Pearson No. 1, Cyclone Spike Puller, each $30 00.....50%
Pelican, ₱ doz. $9.00.....40&10%
Scranton, Case Lots:
No. 2 B (large).....$5.50
No. 3 B (small).....5.00
Smith & Hemenway Co.:
Ajax.....60%
Diamond B, No. 2, case lots, ₱ doz $6.00
Diamond B, No. 3, case lots, ₱ doz $5.50
Eureka.....50%
Giant, No. 1, ₱ doz. $18; No. 2, $16.50; No. 3, $15.....40%
Yankee.....66⅔%

Pulleys—Single Wheel—

Inch.....	*2*	*2¼*	*3*
Awning, doz	$0.55	.85	1.15

Hay Fork, Swivel or Solid Eye.....
doz., 4 in., $1.15; 5 in., $1.40

Inch.....	*2*	*2¼*	*2½*
Hot House, doz	$0.70	.90	1.25
Inch.....	*1¼*	*1½*	*1¾*	*2*
Screw.....*doz*	$0.16	.19	.23	.30
Inch.....	*1¼*	*2*	*2¼*	*2½*
Side.....*doz*	$0 30	.40	.55	.63
Inch.....	*1¼*	*1¾*	*2*	*2¼*
Tackle....*doz*	$0.30	.42	.58	1.00

Stowell's:
Ceiling or End, Anti-Friction..60&10%
Dumb Waiter, Anti-Friction...60&10%
Electric Light.....60%
Side, Anti-Friction.....60&10%

Sash Pulleys—

Common Frame; Square or Round End, per doz., 1¼ and 2 in...16@19c
Auger Mortise, no Face Plate, per doz. 1¾ and 2 in.....16@19c
Auger Mortise, with Face Plate, per doz., 1¾ and 2 in......18@19c
Acme.....1¾ in., 16c; 2 in., 19c
Common Sense, 1¾ in.... ₱ doz., 15¢; 2 in., 20¢.
Fox-All-Steel, Nos. 3 and 7, 2 in. ₱ doz 50%
Grand Rapids All Steel Noiseless....50%
Ideal.....70&5%
Niagara.....1¾ in., 16c; 2 in., 19c
No. 20, Troy....1¾ in., 14½¢; 2 in., 16½¢
Star.....1¾ in., 16¢; 2 in., 19¢
Tackle Blocks—See *Blocks.*

Pumps—

Cistern.....60@60&10%
Pitcher Spout.....80@80&5%
Wood.....50@50&10%

Pump Leathers—

Plunger and Lower Valve—Per gro.:

Inch..	*2*	*2¼*	*2½*	*2¾*
	$2.20	*2.50*	*2.75*	*3.00*
Inch..	*3*	*3¼*	*3½*	*3¾*	*4*
	$3.30	*3.60*	*3.85*	*4.10*	*4.40*

Plunger Cup Leathers—Per 100:

Inch	*2½*	*3*	*3½*	*4*
	$2.75	*3 85*	*5.00*	*6.00*

Barnes Dbl. Acting (low list).... 50&10%
Contractors' Rubber Diaphragm No. 2 B. & L. Block Co.....$16.00
Daisy Spray Pump.....₱ doz. $7.20
Flint & Walling's Fast Mail (low list).5.5%
Flint & Walling's Pitcher Spout.....40%
National specialty Mfg. Co., Measuring $6.00.....30%
Mechanical Sprayer.....$7.20
Myer's Pumps, low list.....50%
Myers' Power Pumps.....50%
Myers' Spray Pumps.....50%

Punches—

Saddlers' or Drive, good..doz. 65@70c
Spring, single tube, good quality...
$1.75@2.00
Revolving (4 tubes)...*doz. $3.50@3.75*
Bemis & Call Co.'s Cast Steel Drive....50%
Bemis & Call Co.'s Check.....55%
Benard Spring Belt Punches.....33⅓%
Lodi Spring Belt Punches.....50%
Morrill's No. 1 (A.B.C.), ₱ doz., $15.00..50%
No. 2, ₱ doz. $22.50.....50%
Hercules, each $7.50.....50%
Niagara Hollow Punches.....40%
Niagara Solid Punches.....55&10%
Paragon Spring Belt Punches.....50%
Steel Screw, B & K. Mfg. Co.....40%
Tinners' Hollow, P., S. & W. Co.35@35&5%
Tinners' Solid, P., S. & W. Co., ₱ doz., $1.44.....60%

Rail—Barn Door, &c.—

Cast Iron, Barn Door: Flange Screw Holes for Rd. Groove Wheels:

½	*⅝*	*¾ in.*
$1.70	*$2.10*	*$3 00 100 feet.*

Angular for Sq. Groove Wheels:

Small.	*Med.*	*Large.*
$1.50	*1.90*	*2.60 100 feet.*

Sliding Door, Iron Painted..2¼@2¾c
Sliding Door, Wrought Brass, 1½ in.....*lb.36c*..30%
Allith Mfg. Co., No. 1, Reliable Hanger Track, ₱ foot.....8¢
Allith Mfg. Co., No. 2, Reliable Hanger Track, ₱ foot.....10¢
Cronk's Double Braced Steel Rail, ₱ foot.....3½¢
Cronk's O. N. T. Rail.....3¾¢
Lane's Hinged Track, ₱ 100 ft., 1 in., $3.70; 1¼ in., $4.40
Lanes' O. N. T., ₱ 100 ft., 1 inch, $3.00; 1¼ inch, $3.70; 1½ inch, $4.00.
Lanes' Standard, 1¼ in., ₱ 100 ft.....4.10
Lawrence Bros., ₱ ft. 11¢.....60%
Lawrence Bros. New York.....3½¢
McKinney's Hinged Hanger Rail ₱ foot, 11¢.....50%
McKinney's None Better.....₱ ft. 3¾¢
McKinney's Standard.....₱ ft. 4 ¢
Myers' Stayon Track.....50&10%
Smith's Wrought Bracket, Plain.....3½¢
Smith's Special.....4½¢
Smith's Never Jump, per ft. 11¢.....50%
Smith's Plain Steel.....30%
Smith's Milled Steel.....4½¢
Stowell's Cast Rail.....₱ ft. 1½¢
Stowell's Steel Rail, Plain.....2½
Stowell's Wrought Bracket, 1¼x5-15.....₱ ft. 3¢
Stowell's Wrought Bracket, 1¼x5-15.....₱ ft. 7¢
Swett's Hylo, per ft. 11¢.....50&10%
Swett's P. L. B. Steel Rail, ₱ 100 ft. $3.00

Rakes—

Net Prices, Malleable Rakes:

10	*12*	*14*	*16-tooth*
Shank.....*$1.50*	*1.60*	*1.75*	*1.85*
Socket.....*$1.65*	*1.80*	*1.95*	*2.10*

Steel, Garden and Gravel, Aug. 1, '99 List.....70%
Weldless Steel.....75&5%
Malleable Iron, Garden.....70&10%
Lawn Rakes, Metal Head, per doz,
20 teeth.....*$3.25@3.50*
24 teeth.....*$3.50@3.75*
Fort Madison Red Head Lawn.....$3 25
Fort Madison Blue Head Lawn.....3.00
Jackson Lawn, 29 and 30 teeth, ₱ doz., net, $4.25
Kohler's:
Lawn Queen, 20-tooth, ₱ doz.....$3.45
Lawn Queen, 24-tooth, ₱ doz.....3.60
Paragon, 20 tooth, ₱ doz.....2.75
Paragon, 24-tooth, ₱ doz.....3.00
Steel Garden, 14-tooth, ₱ doz.....2.98
Malleable Garden, 14-tooth, ₱ doz..2.00

Rasps, Horse—

Disston's.....75%
Heller Bros.....70&5&10&10&5%
McCaffrey's American Standard.....60&10&5%
See also *Files.*

Razors—

Borsalic.....60 & 10%
Fox Razors, No. 42..₱ doz. $30.00 } 25
Fox Razors, No. 44, ₱ doz. $20.00 } to
Fox Razors, No. 82, Platina, ₱ doz.) 33⅓
-25 (
Red Devil.....60%
Silberstein:
Carbo Magnetic.....$18.00
Griffon, No. 65.....$15.00
Griffon, No. 00.....$12.00
All other Razors.....40%

Safety Razors—

Safety Razors.....40%
New Gem, in Tin Boxes.....₱ doz. $12.00
New Gem, Extra Blades.....₱ doz. $8.35
Gem Outfits (Razor, Strop, etc.).....₱ doz. $5.60
Complete Razor, extra Blade in Leather Case.....₱ doz. $27.00
Silbersein.....40%

Reels—Fishing—

Bishop's Independent Fish Reel Spooler, ₱ doz.....$30.00
Hendryx:
M 6, Q 6, A 6, B 6, M 9¼, M 14, Q 16, A 16, B 16, 4008, Rubber Populo, Nickeled Populo.....20%
Aluminum, German Silver, Bronze.25%
1240 N, 124 N.....20%
3004 N, 06 N, 6 RM, G 9.....25%
4 N, 6 PN, 24 N, 26 PN.....20%
3904 P.....33⅓%
3904 PN.....33⅓%
0924 N.....33⅓%
020S4 N.....33⅓%
0029D4 PN.....33⅓%
802 N.....33⅓%
988 PN, 2904 N, 974 PN.....25%
5009 PN, 5009 N.....20%
Competitor, 102 P, 102 PN, 202 P, 202 PN, 102 PR, 202 PR.....9%
304 P, 304 PN, 00304 P, 00304 PN.33⅓%

Registers—*List July 1, 1903.*

Black Jap
White Jap
Bronzed
Nickel Plated
Electro Plated
} *70¢ 100@75 & 10%*

Registers, Cash—

Sun, No. 10, Metal Cabinet.....$30.00
Sun, No. 10, Wood Cabinet.....25.00

Revolvers—

Single Action.....*85@90c*
Double Act'n, except 44 cal.....*$1.90*
Double Action, 44 caliber.....*$2.05*
Automatic.....*$3.60*
Hammerless.....*$4.10*
Note.—Jobbers frequently cut the above prices of manufacturers for small trade.

Riddles, Hardware Grade

16 in., per doz.....*$2.25@$2.50*
17 in., per doz.....*$2.50@$2.75*
18 in., per doz.....*$2.75@$3 00*

Rings and Ringers—Bull Rings—

2	*2½*	*3 Inch*
Steel.....*$0.70*	*0.75*	*0.80 doz.*
Copper..... *1.00*	*1.15*	*1.50 doz.*

Hog Rings and Ringers—

Hill's Rings....*gro. boxes, $4.25@4.50*
Hill's Ringers, Gray Iron. doz. 55@60c
Hill's Ringers, Mal. Iron, doz. 75@80c
Blair's Rings.....*per gro. $5.00@5.25*
Blair's Ringers....*per doz. $0.60@ .65*
Brown's Rings....*per gro. $5.50@5.75*
Brown's Ringers..*per doz. $0.75@ .85*

Rivets and Burrs—

Copper.....*50¢10@50¢10¢10%*
Iron or Steel:
Tinners'.....*75¢10@75¢10¢5%*
Miscellaneous.....*70¢10@75%*

Rollers—

Acme, Stowell's Anti-Friction.....50%
Barn Door, Sargent's list.....60%
Cronk's Stay.....66⅔&5%
Cronk's Brinkerhoff.....66⅔%
Lane's Stay.....33⅓&5%
Stowell's Barn Door Stay....₱ doz. $1.00

Rope—

Manila, 7-16 in. diam. and larger, tarred or untarred.....*lb.* .. *@11½c*
Manila, Hay, Hide and Bale Ropes, Medium and Coarse.....*lb.* .. *@11½c*
Sisal, 7-16 in. diam. and larger:
Mixed.....*lb.* .. *@ 8¼c*
Pure.....*lb.* .. *@ 9¼c*
Sisal, Hay, Hide and Bale Ropes, Medium and Coarse:
Mixed.....*lb.* .. *@ 8¼c*
Pure.....*lb.* .. *@ 9¼c*
Sisal, Tarred, Medium Lath Yarn:
Mixed.....*lb.* .. *@ 7¾c*
Pure.....*lb.* .. *@ 8¼c*
Cotton Rope: —*Lb.*—
Best.....*¼-in. and larger*.. *14@15c*
Medium..*¼-in. and larger*.. *13@14c*
Com.....*¼-in. and larger*.. *9@10c*
Jute Rope:
Thread No. 1, ¼-in. and up, lb. *6½c*
Thread No. 2, ¼-in. and up, lb. *6 c*
Old Colony Manila Transmission Rope, ₱ lb 17½¢

Wire Rope—

Galvanized.....*40&5%*
Plain.....*45&5%*

Ropes, Hammocks—

Covert Mfg. Co.:
Jute.....60&5%
Sisal.....20%
Covert Saddlery Works.....60&5%

Rules—

Boxwood.....*60&10@60¢10¢5%*
Ivory.....*35¢10@35¢10¢5%*
Chapin-Stephens Co.:
Boxwood.....60@60&10%
Ivory.....35@35&10&10%
Miscellaneous.....50@50&10&10%
Combination.....55@55&10%
Stationers'.....10@10&10%
Lufkin's Steel.....50&10%
Lufkin's Lumber.....60&10%
Stanley R. & L. Co.:
Boxwood.....60@60&10%
Ivory.....35@35&10&10%
Upson Nut Co.:
Boxwood.....60@60&10%
Ivory.....35&10@35&10&10%

Sash Locks—See *Locks, Sash*

Sash Weights—

See *Weights, Sash.*

Sausage Stuffers or Fillers—See *Stuffers or Fillers, Sausage*

Saw Frames—See *Frames, Saw.*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Saws—

Atkins:
Circular.....50%
Band.....50&10@60%
Cross Cuts.....35&5%
Mulay, Mill and Drag.....50%
One-Man Saw.....40%
Wood Saws.....40%
Hand, Compass, &c.....40%
Chapin-Stephens Co.:
Turning Saws and Frames....30@30&10%
Diamond Saw & Stamping Works:
Sterling Kitchen Saws.....30&10&5%
Disston's:
Circular, Solid and Inserted Tooth..30%
Band, 3 to 14 in wide.....60%
Band, ¼ to 2¼.....70%
Crosscuts.....45%
Narrow Crosscuts.....50%
Mulay, Mill and Drag.....50%
Framed Woodsaws.....35%
Woodsaw Blades.....35%
Woodsaw Rods.....25%
Hand Saws, Nos. 12, 99, 9, 16, d100, D8, 120, 76, 77, 8.....25%
Hand Saws, Nos 7, 107, 107½, 8, 1, 0, 00, Combination.....30%
Compass, Keyhole, &c.....25%
Butcher Saws and Blades.....35%
C. E. Jennings & Co.'s.:
Back Saws.....25&10%
Butcher Saws.....30&10%
Compass and Key Hole Saws.35&5&10%
Framed Wood Saws.....30&10%
Hand Saws.....20&25&10%
Wood Saw Blades.....30&10%
Millers Falls:
Butcher Saws.....15&10%
Star Saw Blades.....15&10%
Peace & Richardson's Hand Saws.....30%
Simonds':
Circular Saws.....50%
Crescent Ground Cross Cut Saws..35%
One-Man Cross Cuts.....40&10%
Gang Mill, Mulay and Drag Saws..50%
Band Saws.....50%
Back Saws.....25@25&7½%
Butcher Saws.....35@35&7½%
Hand Saws.....25@25&7½%
Hand Saws, Bay State Brand.....25%
Compass, Keyhole, &c.....25@25&7½%
Wood Saws.....35@35&7½%
Wheeler, Madden & Clemson Mfg. Co.'s
Cross Cut Saws.....50%

Hack Saws—

Atkins' Hack Saw Blades A A A.... 25%
Disston:
Concave Blades.....25%
Keystone.....40%
Hack Saw Frames.....30%
Fitchburg File Works, Tue Best.....25%
C. E. Jennings & Co.'s:
Hack Saw Frames, Nos. 175, 180.....35&5&10%
Hack Saws, Nos. 175, 180, complete.....35&5&10%
Goodell's Hack Saw Blades.....40%
Griffin's Hack Saw Frames..35&5&10%
Griffin's Hack Saw Blades.....35&5&10%
Star Hack Saws and Blades.....15&10%
Sterling Hack Saw Blades.....25%
Sterling Hack Saw Frames....30& 0&5%

Scroll—

Barnes' No. 7, $15.....25%
Barnes' Scroll Saw Blades.....40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, $18; with boring attachment, $20.....20%
Lester, complete, $10.00.....15&10%
Rogers, complete, $4.00.....15&10%

Scalers, Fish—

Bishop's Lightning.....₱ doz. $3 00
Covert's Saddlery Works.....60&10%

Scales—

Family, Turnbull's.....*50@50&10%*
Counter:
Hatch, Platform, ½ oz to 8 lbs, doz. $16
Two Platforms, ½ oz to 8 lbs, doz. $16
Union Platform, Plain..$1.70@1.90
Union Platform, Striped $2.35@2.15
Chatillon's:
Eureka.....25%
Favorite.....40%
Grocers' Trip Scales.....50%
Chicago Scale Co.:
The "Little Detective," 25 lbs.....50%
Union or Family No. 2.....60%
Portable Platform (reduced list).....50%
Wagon or Stock (reduced list)..25@35%
Pelouze Scales—Household, Counter, Candy, Ice, Postal, Computing.....50%
"The Standard" Portables.....50%
"The Standard" R. R. and Wagon.....50%

Scrapers—

Box, 1 Handle.....*doz. $2.00@2.25*
Box, 2 Handle.....*doz. $2.60@2.85*
Ship Light, $2.00; Heavy, $4.50
Adjustable Box Scraper (S. R. & L. Co.) $6.00.....50@50&10%
Chapin-Stephens Co., Box.....50@50&10%

Screens, Window, and Frames—

Flyer Pattern Screens...60&5@60&5&2½%
Maine Screen Frames.....40&10&5%
Perfection Screens.....60&5@60&5&2½%
Phillips' Screen Frames..60&5@60&5&2½%
Porter's:
Fairview Screens.....60&5@60&5&2½%
Hummer Screens.....60&5@60&5&2½%
Klondike Screens.....60&5@60&5&2½%
See also *Doors.*

Screws—Bench and Hand—

Bench, Iron..doz. 1 in..$2.50@2.75 :
1½, $3 00@3.25; 1¼, $3.50@3.75
Bench, Wood, Beech....doz. 30@30&5
Hand, Wood.....30@30&5%
R. Bliss Mfg. Co, Hand.....30%
Chapin-Stephens Co., Hand.....30@30&10%

Coach, Lag and Hand Rail—

Lag, Common Point, list Oct. 1. 99.....75@10@75@10@10%
Coach and Lag, Gimlet Point, list Oct. 1. '99.....75@5@75@10@5%
Hand Rail, list Jan. 1, '81.60@10@...%

Jack Screws—

Standard List.....75@10@80@5%
Millers Falls.....50@10@10%
Millers Falls, Roller.....50@10%
P., S. & W.....50@50@5%
Sargent.....70%

Machine—

List Jan. 1, '98.
Flat or Round Head, Iron.50@50@10%
Flat or Round Head, Brass50@50@10%

Set and Cap—

Set (Iron or Steel).....70@10@5%
Sq. Hd. Cap.....65@10@5%
Hex. Hd. Cap.....65@10@5%
Rd. or Fillister Hd. Cap.....60%

Wood—

List July 23, 1903.
Manufacturers' printed discounts :
Flat Head, Iron.....87½@10@...%
Round Head, Iron.....85@10@...%
Flat Head, Brass.....85@10@...%
Round Head, Brass.....80@10@...%
Flat Head, Bronze....77½@10@...%
Round Head, Bronze.....75@10@...%
Drive Screws.....87½@10%

Scroll Saws—See *Saws, Scroll.*

Scythes—

Per doz.
Clipper Pattern, Grass...$4.25@$5.00
Full Polished Clipper.....$4.75@$5.50
Grain.....$7.00@$7.50
Clipper, Grain.....$7.75@$8.25
Weed and Bush.....$4.50@$5.00

Seeders— Raisin—

Enterprise.....25@30%

Sets— Awl and Tool—

Awl and Tool Sets :
Wood Hdle., 10 Awls doz. $2.00@$2.25
Wood Hdle., 14 Awls, 6 Tools doz. $2.50@$3.00
Aiken's Sets, Awl and Tools :
No. 20, ₩ doz. $10.00.....50&10&10%
Fray's Adj. Tool H'dls...Nos. 1, $12; 2, $18 3, $12; 4, $9; 5, $7.....50%
C. E. Jennings & Co.'s Model Tool Holders.....5&10%
Millers Falls Adj. Tool H'dls, No. 1, $12; No. 4, $12; No. 5, $18.....15&10%
Stanley's Excelsior :
No. 1, $7.50; No. 2, $4.00; No. 3, $5.50.....40&30&10&10%

Garden Tool Sets—

Ft. Madison Three Po..s, Hoe, Rake and Shovel.....₩ doz. sets.....$9.00

Nail—

Square.....per gro. $2.25@2.50
Round, Bl'd, and Pol., assorted.....gro. $1.80@2.00
Octagon.....gro. $1.50@2.75
Buck Brothers.....37½%
Cannon's Diamond Point, ₩ gr. $13.....25%
Mayhew's.....per gro. $2.00
Snell's Corrugated, Cup Pt. per gro. $7.50
Snell's Knurled, Cup Pt....per gro $7.50

Rivet—

Regular list.....70@10@75%

Saw—

Aiken's:
Genuine.....50&10%
Imitation.....50&10%
Atkin's:
Criterion.....40%
Adjustable.....40%
Bemis & Call Co's.:
Cross Cut.....30%
Hammer, new Pat.....45%
Plate.....20%
Spring Hammer.....40%
Disston's Star and Monarch.....25%
Morrill's No. 1, $15.00.....50%
Nos. 3 and 4, Cross Cut, $20.83.....50%
No. 5, Mill, $30.00.....50%
Nos. 10, 11, 9½, $15.83.....50%
No. 1 Old Style, $10.00.....50%
Special, $16.25.....50%
Giant Royal, Cross Cut.....₩ doz. $8.50
Royal, Hand.....₩ doz. $5.00
Taintor Positive, ₩ doz. $18.....60%

Shaving—

Fox Shaving Sets, No. 30, per doz, $24.00 net

Sharpeners, Knife—

Chicago Wheel & Mfg. Co.....63%

Shaves Spoke—

Iron.....doz. $1.00@1.15
Wood.....doz. $1.75@2.00
Bailey's (Stanley R. & L. Co.).....30@30&10&10%
Chapin-Stephens Co.....30@30&10&10%
Goodell's, ₩ doz. $9.00.....15&10%
Wood's F1 and F2.....50%

Shears—

	7	8	9 in.
Cast Iron...			
Best	$16.00	18.00	20.00 gro.
Good	$13.00	15.00	17.00 gro.
Cheap	$5.00	6.00	7.00 gro.

Straight Trimmers, &c.:
Best quality, Jap.....70@70@10%
" Nickel.....60@60@10%
Fair qual. Jap.....50@50@5%
" Nickel.....75@75@10%
Tailors' Shears.....40@40@10%
Acme Cast Shears.....40@40&5%
Heinisch's Tailors' Shears.....30%
Wilkinson's Hedge.....1900 list 45%
Wilkinson's Branch, Lawn and Border.....40%
Wilkinson's Sheep.....1900 list. 50%

Tinners' Snips—

Steel Blades.....20@5@20@10
Steel Laid Blades.....40@10@20%
Forged Handles, Steel Blades, Berlin.....40@40@10%
Heinisch's Snips.....40%
Jennings & Griffin Mfg. Co.'s, 6¼ to 10 inch.....40@7½&10%
Niagara Snips.....40%
P., S & W. Co.....20%
Triumph Pipe Shear.....₩ doz. 9.00

Pruning Shears and Tools—

Cronk's Grape Shears.....33⅓%
Cronk's Pruning Shears.....33⅓%
Disston's Combined Pruning Hook and Saw, ₩ doz. $18.00.....25%
Disston's Pruning Hook, ₩ doz. $12.00.....25%
John T. Henry Mfg. Co.:
Pruning Shears, all grades.....40@40&5%
Orange Shears.....50&10@50&20%
Grape.....40&10@50%
Tree Pruners.....75%
P., S. & W. Co.....33⅓%

Sheaves—Sliding Door—

Stowell's Anti-Friction.....50%
Patent Roller Hatfield's, Sargent's list.....70&10%
Reading.....50%
R. & E. list.....33⅓%
Wrightsville Hatfield Pattern.....50%

Sliding Shutter—

Reading list.....50%
R. & E. list.....33⅓%
Sargent's list.....50&10%

Shells— Shells, Empty—

Brass Shells, Empty :
First quality, all gauges.....60&5%
Climax, Club, Rival, 10 and 12 gauge.....65&5%
Paper Shells, Empty :
Acme, Ideal, Leader, New Rapid, Magic 10, 12, 16 and 20 gauge..5&5%
Blue Rival, New Climax, Challenge, Monarch, Defiance, Repeater, Yellow Rival, 10, 12, 16 and 20 gauge.....20%
Climax, Union, League, New Rival 10 and 12 gauge.....25%
Climax, Union, League, New Rival, 14, 16 and 20 gauge ($7.50 list)..30%
Expert, Metal Lined and Pigeon, 10, 12, 16 and 20 gauge.....33⅓&5%
Robin Hood, Low Brass.....20&10%
Robin Hood, High Brass.....30&10%

Shells, Loaded—

Loaded with Black Powder.....40%
Loaded with Smokeless Powder, medium grade.....5&5%
Loaded with Smokeless Powder, high grade.....40@10@10%
Robin Hood Smokeless Powder:
Robin Hood, Low Brass.....50%
Comets, High Brass.....50&10&5%

Shoes Horse, Mule, &c.—

F. o. b., Pittsburg:
Iron.....per keg $3.85
Steel.....per keg 3.60
Burden's, all sizes, ₩ keg.....$3.90

Shot—

Drop, up to B, 25-lb. bag.....$1.60
Drop, B and larger, per 25-lb. bag $1.85
Buck, 25-lb. bag.....$1.85
Chilled, 25-lb. bag.....$1.85

Shovels and Spades—

Association List, Nov. 15, 1902....40%

Sieves and Sifters—

Hunter's Imitation, gro. $10.50@11.00
Buffalo Metallic Blued, S. S. & Co., ₩ gr.:

14&16	16&18	18&20
$13.20	$13.50	$14.40

National Mfg. Co.:
Victor.....per gro. $12.00
Surprise.....per gro. $11.00
No Name.....per gro. $11 00
Shaker (Barler's Pat.) Flour Sifters. ₩ doz., $3.00.....40%

Sieves, Tin Rim—

Per dozen.

Mesh	½	16	18	20
Black, full size	$1.20	1.35	1.50	1.35
Plated, full size	$1.30	1.35	1.40	1.45
Black, scant	$0.95	1.00	1.05	

Sieves, Wooden Rim—

Nested, 10, 11 and 12 Inch.
Mesh 18, Nested, doz.....$0.90@0 95
Mesh 20, Nested, doz.....1.00@1.05
Mesh 24, Nested, doz.....1.30@1.40

Sinks—

Cast Iron—

Standard list.....60@60@10%
NOTE.—*There is not entire uniformity lists used by jobbers.*

Skeins Wagon—

Cast Iron.....70@70@10%
Malleable Iron.....40@10@50%
Steel.....40@40@10%

Slates, School—

Factory Shipments.
"D" Slates.....40@10%
Noiseless Slates.....60@5 tens

Slaw Cutters—See *Cutters.*

Slicers, Vegetable—

Sterling No. 10, $2.00.....33⅓

Snaps, Harness—

German.....40@40@10%
Covert Mfg. Co.:
Deroy.....20&2&2%
High Grade.....45%
Jockey.....30&10%
Trojan.....40%
Yankee.....30&5&2%
Yankee, Roller.....30&5&2%
Covert's Saddlery Works:
Crown.....60%
German.....60%
Model.....60%
Triumph.....60%
Oneida Community Solid Swivel.....60%
Sargent's Patent Guarded.....60%&10%

Snaths—

Scythe.....45%

Snips, Tinners'—See *Shears*

Spoons and Forks—

Silver Plated—

Good Quality.....50@10@60@5%
Cheap.....40@60@10%
International Silver Co.
1847 Rogers Bros. and Rogers & Hamilton.....40&10%
Rogers & Bro., William Rogers Eagle Brand.....50&10%
Anchor, Rogers Brand.....60%
Wm. Rogers & Son.....60&10%
Simeon L. & Geo. H. Rogers Co.:
Silver Plated Flat Ware.....60%
No. 17 Silver Plated Ware.....60&10%

Miscellaneous—

German Silver.....60@60@5%
Cattaraugus Cutlery Co.:
Yukon Silver.....50%
Simeon L. & Geo. H. Rogers Co.:
German or Nickel Silver, Special list.....&10%

Tinned Iron—

Teas.....per gro. 45@50c
Tables.....per gro. 90c@$1.00

Springs— Door—

Gem (Coil).....20%
Star (Coil).....30%
Torrey's Rod, 39 in.....₩ dos. $1.10
Victor (Coil).....50@10&10%

Carriage, Wagon, &c.

1¼ in. and Wider :
Black or ¼ Bright, lb.....4¼@5 c
Bright, lb.....5¼@5½c
Painted Seat Springs :
1¼ x 2 x 26, per pr.....50@55c
1½ x 2 x 28 per pr.....60@65c
1½ x 3 x 28 and narrower, per pr. 80@85c

Sprinklers, Lawn—

Enterprise.....25@20%
Philadelphia No. 1, ₩ doz. $12; No. 2, $15; No. 3, $24.....30%

Squares—

Nickel plated.... } List Jan. 5, 1900.
Steel and Iron... } 70@10@70@10@10%
Rosewood Hdl Try Square and T-Bevels.....60@10@10@70%
Iron Hdl. Try Squares and T-Bevels. 40@10@40@10@10%
Disston's Try Sq. and T-Bevels.....70%
Winterbottom's Try and Miter.....40&10@40&10&10%

Squeezers— Lemon—

Wood, Common, gro., No. 0, $5.25 @$5.50 : No. 1, $6.25@$6.50.
Wood, Porcelain Lined, Cheap.....doz. $2.00@2.75
Good Grade.....doz. $3.00@3.25
Tinned Iron.....doz. $0.75@1.25
Iron, Porcelain Lined doz. $2.90@3.25

Staples—

Barbed Blind.....lb. 6@6½c
Electricians', Association list.....80@10&10&10%
Fence Staples, See Trade Report,
Poultry Netting, Staples....per lb..3½@3½c
Grand Crossing Tack Co.'s list....80&10%

Steels, Butchers'—

Dick's.....30%
Foster Bros'.....30%
C. & A. Hoffmann's.....40%

Steelyards.....30@30@10%

Stocks and Dies—

Blacksmiths'.....40@10@50%
Curtis Reversible Ratchet Die Stock.35%
Derby Screw Plates.....25%
Gardner Die Stocks No. 1.....50%
Gardner Die Stocks, larger sizes.....40%
Green River.....25%
Lightning Screw Plate.....25%
Little Giant.....25%
Reece's New Screw Plates.....25@30%

Stone—

Scythe Stones—

Chicago Wheel & Mfg. Co:
Gem Corundum, 10 inch, $3.00 per gro., 12 inch, $10.80
Norton Emery Scythe Stones:
Less than gro. lots.....₩ gro. $9.00
One gross or more.....₩ gro. $7.20
Lots of 10 gross or more....₩ gro $6.00
Pike Mfg. Co. 1901 list:
Black Diamond S. S....₩ gro. $12.00
Lamoille S. S.....₩ gro. $11.00
White Mountain S. S....₩ gro. $9.00
Green Mountain S. S....₩ gro. $6.00
Extra Indian Pond S. S. ₩ gro. $7.50
No. 1 Indian Pond S. S..₩ gro. $7.00
No. 2 Indian Pond S. S..₩ gro. $4.50
Leader ded End S. S....₩ gro $4.50
Balance of 1901 list 33⅓% } 40%

Oil Stones, &c.

Chicago Wheel & Mfg. Co., 1901 list:
Gem Corundum Oil, Double Grit.....30%
Gem Corundum Axe, Single or Double Grit.....55%
Gem Corundum Slips.....55%
Gem Corundum Razor Hones.....50%
Pike Mfg. Co. 1901 list: ₩ ₩
Arkansas Stone, No. 1, 3 to 5½ in. $2.50
Arkansas Stone, No. 1, 5½ to 8 in. $3.50
Arkansas Slips No. 1.....$4.00
Lily White Washita 4 to 8 i....60¢
Rosy Red Washita, 4 to 8 in....60¢
Washita Stone, Extra, 4 to 8 in..50¢
Washita Stone, No. 1, 4 to 8 in..40¢
Washita Stone, No. 2, 4 to 8 in..30¢
Lily White Slips.....90¢
Rosy Red Slips.....90¢
Washita Slips, Extra.....80¢
Washita Slips, No. 1.....70¢
India Oil Stones (entire list).....33⅓% } 33⅓%
Hindostan No. 1, Regular....₩ ₩ 8¢
Hindostan No. 1 Small.....₩ ₩ 10¢
Axe Stones (all kinds).....
Turkey Oil Stones, ex. 5 tos in. ₩ ₩ 8¢
Queer Creek Stones, 4 to 8 in.....20¢
Queer Creek Slips.....40¢
Sand Stone.....
Belgian, German and Swaty Razor Hones.....50% } 40%
Natural Grit Carving Knife Hones, ₩ doz.....$8.00
Quick Edge Pocket Knife Hones, ₩ doz.....$3.00
Mounted Kitchen Sand Stone, ₩ doz.....$1.50

Stoners— Cherry—

Enterprise.....25@30%

Stops, Bench—

Millers Falls.....15&10%
Morrill's...₩ doz., No. 1, $10.00.....50%
Morrill's, No. 2, $12.50.....50%

Door—

Chapin-Stephens Co.....60@60&10%

Plane—

Chapin-Stephens Co.....20%

Straps— Box—

Cary's Universal, case lots....20&10&10%

Hame—

Covert's Saddlery Works.....60&10%

Stretchers, Carpet—

Cast Iron, Steel Points....doz. 55@60c
Socket.....doz. $1.75
Excelsior Stretcher and Tack Hammer Combined, per doz. $6.....20%

Stuffers, Sausage—

Enterprise Mfg. Co.....25@25&7½%
National Specialty Mfg. Co., list Jan. 1, 1902.....30&5%

Sweepers, Carpet—

National Sweeper Co.:	Per doz.
Loyal, Roller Bearing, Fancy Veneers	$25.00
Marion, Roller Bearing, regular finishes, full Nickel	$24.00
Marion Queen, Roller Bearing, full Nickel	$24.00
Monarch, Roller Bearing, Nickel	$22.00
Monarch, Roller Bearing, Jap'ned	$20.00
Transparent, Roller Bearing, Plate Glass Top, Nickel	$9 .00
Monarch Extra, Roller Bearing, (17-inch case), Nickel	$36.00
Monarch Extra, Roller Bearing (17-inch case), Japanned	$33.00
National Queen, Fancy Veneers	$27.00
Perpetual, Regular Bearings, Nickel	$30.00
Perpetual, Regular Bearings, Jap.	$18.00

NOTE.—*Discount of 30c per dozen on three-dozen lots. Discount of $1 per dozen on five-dozen lots.*

Tacks, Brads, &c.—

List Jan. 15, '99.
Carpet Tacks, American.....90@25@5@....%
American Cut Tacks.90@20@5@....%
Swedes Iron Tacks...90@30@5@....%
Swedes Upholsterers' Tacks.....90@45&10@5@....%
Gimp Tacks.....90@45@5@....%
Lace Tacks.....90@40@....%
Trimmers' Tacks..90@30@10@5@....%
Looking Glass Tacks....70@10@....%
Bill Posters' and Railroad Tack....90@45@5@....%
Hungarian Nails....80@30@5@....%
Common and Patent Brads.....80@10%
Trunk and Clout Nails...80@5@....%

NOTE.—*The above prices are for Straight Weights.* An extra 5% is given Star Weights** and an extra 10@5% on Standard Weights.****

Miscellaneous—

Double Pointed Tacks...90 and 6 tens
Steel Wire Brads, R. & E. Mfg. Co 's list..50&10@6%

See also *Nails, Wire.*

Tanks, Oil—

	Each.
Emerald, S. S. & Co.....30-gal	$3.25
Emerald, S. S. & Co.....60-gal.	$4.00
Queen City S. S. & Co., 30-gal	$3.65
Queen City S. S. & Co., 60-gal	$4.50

Tapes, Measuring—

American Asses' Skin.....40@10@50%
Patent Leather.....25@30@5%
Steel.....40@40@10%
Chesterman's.....25@25@5%
Eddy Asses' Skin.....40@10@50%
Eddy Patent Leather.....25@30@5%
Eddy Steel.....40@40@10%
Keuffel & Esser Co., Steel and Metallic, Lower list, 1899.....35%
Lufkin's Steel.....33⅓@35%
Lufkin's Metallic.....30@30&5%

Teeth, Harrow—

Steel Harrow Teeth, plain or headed, ⅝ inch and larger, per 100 lbs...$3.00

Thermometers—

Tin Case.....80@10@80@10@5%

Ties, Bale—Steel Wire.

Single Loop.....80@2½
Monitor, Cross Head, Etc.....70%

Brick Ties—

Niagara Brick Ties.....20&10%

Tinners' Shears, &c.—

See *Shears, Tinners', &c.*

Tinware—

Stamped, Japanned and Plated, sold very generally at net prices.

Tips, Safety Pole—

Covert's Saddlery Works.....60&10%

Tire Benders, Upsetters, &c.—See *Benders and Upsetters, Tire.*

Tools— Coopers'—
L. & I. J. White ..... 20@20&5%

Hay—
Myers' Hay Tools 50%
Stowell's Hay Carriers 5%
Stowell's Hay orks 50%
Stowell's Fork Pulleys 5%

Saw—
Atkins' Cross Cut Saw Tools 40%
Simonds' Improved 33⅓%
Simonds' Crescent 25%

Ship—
L. & I. J. White 25%

Transom Lifters—
See *Lifters, Transom.*

Traps— Fly—
Balloon, Globe or Acme ..... doz. $1.15@1.25 ; gro. $11.50@12.00
Harper, Champion or Paragon ..... doz. $1.25@1.40 : gro. $13.00@13.50

Game—
Oneida Pattern ..... 80@30&5%
Newnouse ..... 45@45&5%
Hawley & Norton ..... 65@65&5%
Victor (Oneida Pattern) ..... 75@75&5%
O.C. Jump (Blake Pattern) 60&5@60&10%

Mouse and Rat—
Mouse, Wood, Choker, doz. holes ..... 3½@9c
Mouse, Round or Square Wire ..... doz. 85@90c

Marty French Rat and Mouse Traps (Genuine):
No. 1, Rat, Each $1.12½ ; ₱ doz. $12.00
No. 3, Rat, ₱ doz. $.6.00; case of 50 ..... $5.25 doz.
No.3½, Rat, ₱ doz. $4.75; case of 72 ..... $4.25doz.
No. 4, Mouse, ₱ doz. $3.50; case of 7 ..... $2.75 doz.
No. 5, Mouse, ₱ doz. $2.75; case of 150 ..... $2.25
Schuyler's Rat Killer, No. 1, ₱ gr. $30.00
No. 2, ₱ gr. $30.00; Mouse, No. 3, $18.00 ..... 50%
J. M Mast Mfg. Co.: Per gro.

	Mouse.	Rat.
Blizzard	No. 12, $3.00	No. 1, $9 50
Old Nick	No. 30, 2.22	No. 2, 8.40
Joker	No. 5, 2.10	No. 3, 8.40

Imp'd Snap Shot, Mouse, per gro., 2 hole, $2.40.
Imp'd Snap Shot, Mouse, per gro., 4 hole, $4.20.

Trimmers Spoke—
Bonney's Nos. 1 and 2 ..... 33⅓%
Wood's F 1 ..... 50%

Trowels—
Disston Brick and Pointing 30%
Disston Plastering 25%
Disston "Standard Brand" and Garden Trowels 35%
Kohler's Steel Garden Trowels, 5 in. ..... ₱ gro. $5.00
Kohler's Steel Garden Trowels, 6 in. ..... ₱ gro. $6.00
Never-Break Steel Garden Trowels 30%
Rose Brick and Plastering ..... 25&5%
Woodrough & McFarlin, Plastering .. 25%

Trucks, Warehouse, &c.—
B. & L. Block Co.:
New York Pattern ..... 50&10%
Western Pattern ..... 60&10%
Handy Trucks ..... per doz. $16.00
Grocery ..... per doz. $15.00
Daisy Stove Trucks, Improved pattern ₱ doz. $18.50
Model Stove Trucks ..... ₱ doz. $18.50

Tubs, Wash—

	No. 1	2	3
Galvanized, per doz.	*$5.00*	*5.50*	*6.25*

Galvanized Wash Tubs (S. S. & Co.):

	No. 1	2	3	10	20	30
Per doz , net.	$5.70	6.50	7.20	6.30	7 20	8.10

Twine—Miscellaneous—

Flax Twine—	*BC*	*B.*
No. 9, ¼ and ½-lb. Balls	*20c@22c*	
No. 12, ¼ and ½ lb. balls	*16c@18c*	
No. 18, ¼ and ½-lb. Balls	*14c@16c*	
No. 24, ¼ and ½-lb. Balls	*14c@16c*	
No. 36, ¼ and ½-lb. Balls	*13c@15c*	
Chalk Line, Cotton, ½-lb Balls		*25c*
Cotton Mops, 6, 9, 12 and 15 lb. to doz		*9½@10c*
Cotton Wrapping 5 Balls to lb ... according to quality.		*14c@22c*
American 2-Ply Hemp, ¼ and ½-lb. Balls		*13@14c*
American 3 Ply Hemp, 1-lb. Balls..		*13@14c*
India 2-Ply Hemp, ¼ and ½-lb. Balls (Spring Twine)		*9c*
India 3-Ply Hemp, 1-lb. Balls		*9c*
India 3-Ply Hemp, 1½-lb. Balls..		*8c*
2, 3, 4 and 5-Ply Jute, ½-lb. Balls...		*9@10c*
Mason Line, Linen, ½-lb. Balls		*16c*
No. 2½ Mattress, ¼ and ½-lb Balls		*37c*
Wool, 3 to 6 ply		*5½@6c*

Vises—
Solid Box ..... 50&10@60%

Parallel—
Athol Machine Co :
Simpson's Adjustable 40%
Standard 40%
Amateur 25%
Bonney's 33⅓%
Columbian Hdw. Co. 40%
Emmert Universal :
Pattern Makers' No. 1 ..... $15.00
Pattern Makers' No 2 ..... $12.50
Machinist and Tool Makers' No. 4 .$12.50
Fisher & Norris Double Screw ..... 15&10%
Hollands':
Machinists' ..... 40@40&5%
Keystone ..... 65&5@70%
Lewis Tool Co ..... 20@30%
Merrill's 20%
Miller's Falls ..... 60&10%
Parker's:
Victor ..... 20@25%
Regulars ..... 20@25%
Vulcan's ..... 40@45%
Combination Pipe ..... 55@60%
Prentiss ..... 20@25%
Sargent's 40%
Smith & Hemenway Co.:
Machinists 40%
Jewelers 33⅓%
Snediker's X. L. 33⅓%
Stephens' 33⅓%

Saw Filers'—
Bonney's, No. 1, $13; No. 3, $16 ..... 40%
Disston's D 8 Clamp and Guide, ₱ doz. $30 ..... 25%
Perfection Saw Clamps, ₱ doz. $8.00
Reading 60%
Wentworth's Rubber Jaw, Nos. 1, 2 and 3 ..... 45&50%

Wood Workers'—
Wyman & Gordon's Quick Action, 6 in., $6.00 ; 9 in., $7.00 ; 14 in., $8.00.

Miscellaneous—
Bignall & Keeler Combination Pipe Vise 60%
Hollands' Combination Pipe ..... 60@60&5%
Parker's Combination Pipe:
87 Series 60%
187 Series ..... 60&5%
No. 870 ..... 40%

Wads—Price Per M.

B. E., 11 up	*60c*
B. E., 9 and 10	*70c*
B. E., 8	*80c*
B. E., 7	*80c*
P. E., 11 up	*$1.00*
P. E., 9 and 10	*1.25*
P. E., 8	*1.50*
P. E., 7	*1.50*
Ely's B. E., 11 and larger	*$1.70@1.75*
Ely's P. E., 12 to 20	*$3.00@3.25*

Dis. 15%

Ware Hollow—
Cast Iron, Hollow—
Stove Hollow Ware :
Enameled ..... 55&10@60%
Ground ..... 60&10@65%
Plain or Unground ..... 65&10@70%
Country Hollowware per 100 lbs., $2 50
White Enameled Ware :
Maslin Kettles 70%
Covered Ware :
Tinned and Turned 40%
Enameled 60%
See also *Pots Glue.*

Enameled—
Agate Nickel Steel Ware ..... 50&20
Agate Nickel Steel Ware, Specials ..... 60&15%
Iron Clad Ware ..... 70&10%
Lava, Enameled ..... 40&10%
Never Break Enameled 50%

Tea Kettles—
Galvanized Tea Kettles :

Inch	*6*	*7*	*8*	*9*
Each	*45c*	*50c*	*55c*	*65c*

Steel Hollow Ware.
Avery Spiders & Griddles ..... 65@65&5%
Avery Kettles 60%
Porcelained ..... 50&5&50&10%
Never Break Spiders and Griddles ..... 65&5%
Never Break Kettles 60%
Solid Steel Spiders & Griddles ..... 65&5%
Solid Steel Kettles 60%

Warmers, Foot—
Pike Mfg. Co., Soapstone ..... 40@40&10%

Washboards—
Solid Zinc: ₱ doz
Crescent, family size, bent frame. $3.00
fled Star, family size, stationary protector $3.00
Double Zinc Surface :
Saginaw Globe, family size, stationary protector $2.65
Cable Cross, family size, stationary protector $2.90
Single Zinc Surface :
Naiad, familysize, open back perforated $2.40
Saginaw Globe, protector, family size, ventilated back $2.25
Brass Surface:
Brass King, Single Surface, open back $3.00
Nickel Plate Surface:
No. 1001 Nickel Plate, Single Surface $3.00

Washers—
Leather, Axle—
Solid ..... 80@10@80@10@10%
Patent ..... 90@90@5%
Coil: ⅞ 1 1⅛ 1¼ *Inch.*
11c 12c 13c 14c *per box*

Iron or Steel—
Size bolt 5-16 ⅜ ½ ⅝ ¾
Washers $5.70 4.80 3.50 3.30 3.10
In lots less than one keg add ½c per lb., 5-lb. boxes add ½c to list.

Cast Washers—
Over ½ inch, barrel lots. per lb. ..... 1¼@2c

Waterers, Hog—
Improved Dewey. ₱ doz $13.00

Wedges—
Oil Finish ..... *lb. 2.90@3.00c*

Weights—

Hitching—
Covert's Saddlery Works ..... 60&10%

Sash—
Per ton, f.o.b. factory :
Eastern District *$26.00*
Western, Central and Southern Districts market unsettled, prices ranging from $21.00@25.00

Wheels, Well—
8-in., $1.6 @1.80; 10-in., $2.00@2.25; 12-in., $2.45@2.65; 14-in., $4.00@4.25

Wire and Wire Goods—
Bright and Annealed :
6 to 9 ..... *72½&5@72½&10*
10 to 18 ..... *72½&10@72½&10&5%*
19 to 26 ..... *75&10@2½@75&10@7½%*
27 to 36 ..... *75&10@7½@80&2½%*
Galvanized :
6 to 18 ..... *70@70&5%*
19 to 26 ..... *72½&5@72½&10%*
27 to 36 ..... *72½&10@72½&10&5%*
Coppered :
6 to 9 ..... *70&5@70&10%*
10 to 18 ..... *70&10@70&10&5%*
19 to 26 ..... *75&7½@75&10&2½%*
27 to 36 ..... *75&10@75&10&5%*
Tinned :
6 to 14 ..... *75@75&7½%*
15 to 18 ..... *72½&5@75%*
19 to 26 ..... *70&5@70&5&5%*
27 to 36 ..... *70@70&5%*
Tinned and Annealed on Spools ..... *70@70&5%*
Brass and Copper on Spools ..... *60@60&5%*
Brass, list Feb. 26, '96 ..... *30%*
Copper, list Feb. 26, '96 ..... *15%*
Cast Steel Wire *50%*
Wire Clothes Line, see *Lines.*
Wire Picture Cord, see *Cord.*

Bright Wire Goods—
List June 24, 1903 ..... *90@90&10%*

Wire Cloth and Netting—
Galvanized Wire Netting ..... *80&10%*
Painted Screen Cloth, per 100 ft $1.25
Standard Galv. Hardware Grade :
Nos. 2, 2½ and 3 Mesh, sq. ft. *3c*
Nos. 4 and 5 Mesh, sq. ft. *3½c*
No. 6 Mesh, sq ft *3½c*
No. 8 Mesh, sq ft *4c*

Wire Barb—See *Trade Report.*

Wrenches—
Agricultural ..... 80@30&10%
Baxter Pat'n S Wrenches ..... 70&5@70&10%
Drop Forged S ..... 45@45&5%
Acme ..... 60&10%
Alligator 70%
Alligator Pattern 70%
Bull Dog 70%
Bemis & Call's:
Adjustable S ..... 35&5%
Adjustable S Pipe 40%
Brigg's Pattern ..... 30&10%
Combination Black ..... 40&5%
Combination Bright 40%
Merrick's Pattern 50%
No. 3 Pipe, Bright 55%
Boardman's 33⅓%
Coes' Genuine Knife Hdl. ..... 40&10&5&5%
Coes' Genuine Steel Hdl. ..... 40&10&5&5%
Coes' Genuine Key Model ..... 40&10&5&5%
Coes' "Mechanics' ..... 40&10&10&5&5%
Donohue's Engineer ..... 40&10%
Dudly Combination ..... 50&10&5%
Dudly Pipe ..... 50&10&5%
Dudly Adjustable Pipe ..... 40&10&5%
Eagle ..... 50&10%
Elgin Wrenches 40%
Elgin Monkey Wrench Pipe Jaws 33⅓%
Gem Pocket 30%
Hercules 70%
W. & B. Machinist:
Case lots ..... 50&5%
Less than case lots 40%
Improved Pipe (W & B.) 60%
Solid Handles, P.S. & W ..... 50@50&5%
Stillson 65%
Triumph ..... 60&10%
Vulcan Chain 50%

Fruit Jar—
T & B Fruit Jar Wrenches ..... ₱ gro $9.00
Triumph Fruit Can Wrenches, ₱ gro $9.60
Triumph Fruit Jar Holders ₱ gro. $15.00

Wrought Goods—
Staples, Hooks, &c., list March 17 '92 ..... *90@90&5%*

Yokes Neck—
Covert Saddlery Works, Trimmed 70%
Covert Saddlery Works, Neck Yoke Centers 70%

Yokes, Ox, and Ox Bows—
Fort Madison's Farmers & Freighters' ..... list net

Zinc—
Sheet ..... *lb 6@6¼c*

PAINTS, OILS AND COLORS.

White Lead, Zinc, &c.
Lead, English white, in Oil ..... 8½@ 9¼
Lead, American White, in Oil:
Lots of 500 ℔ or over ..... @ 6½
Lots less than 500 ℔ ..... @ 7
In Barrels ..... @ 6
Lead, White, in oil, 25 ℔ tin pails, add to keg price ..... @ ⅛
Lead, White, in oil, 12½ ℔ tin pails, add to keg price ..... @ 1
Lead, White, in oil, 1 to 5 ℔ assorted tins, add to keg price .. @ 1¼
Lead, American, Terms: For lots 12 tons and over ¼c rebate ; and 2% for cash if paid in 15 days from date of invoice ; for lots of 500 lbs. and over 2% for cash if paid in 15 days from date of invoice; for lots of less than 500 lbs. net.
Lead White, Dry in bbls ..... @ 6
Zinc, American, dry ..... ₱ ℔ 4½@ 4¾
Zinc, Paris, Red Seal, dry ..... @ 8½
Zinc, Paris, Green Seal, dry ..... @ 9¼
Zinc, Antwerp Red Seal, dry ..... @ 6½
Zinc, Antwerp, Green seal, dry .. @ 8¼
Zinc, V. M. French, in Poppy Oil, Green Seal:
Lots of 1 ton and over ..... 12 @12¼
Lots of less than 1 ton ..... 12¼@12¾
Zinc, V. M French, in Poppy Oil, Red Seal:
Lots of 1 ton and over ..... 10¾@11¼
Lots of less than 1 ton ..... 11@11¼
DISCOUNTS.—V. M. French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1%; 25 bbls., 2%; 50 bbls., 4%.

Dry Colors.
Black, Carbon ..... ₱ ℔ 5 @10
Black, Drop, Amer ..... 4 @ 6
Black, Drop, Eng ..... 5 @15
Black, Ivory ..... 16 @20
Lamp, Com ..... 4½@ 6
Blue, Celestial ..... ₱ ℔ 4 @ 6
Blue, Chinese ..... 29 @32
Blue, Prussian ..... 27 @30
Blue, Ultramarine ..... 4½@15
Brown, Spanish ..... ½@ 1
Carmine, No. 40 ..... ₱ ℔ $3.50@3.75
Green, Chrome, ordinary ..... 3½@ 6
Green, Chrome, pure ..... 17 @25
Lead, Red, bbls. ½ bbls. and kegs:
Lots 500 ℔ or over ..... @ 6½
Lots less than 500 ℔ ..... @ 7
Litharge, bbls. ½ bbls. and kegs:
Lots 500 ℔ or over ..... @ 6½
Lots less than 500 ℔ ..... @ 7
Ocher, American ..... ₱ ton $8.50@16.00
Orcher, American Golden ..... 2½@ 3
Orcher, French ..... 1½@ 2½
Orcher, Foreign Golden ..... 3 @ 4
Orange Mineral, English ..... ₱ ℔ 9 @11
Orange Mineral, French ..... 10½@11¼
Orange Mineral, German ..... 8½@ 9
Orange Mineral, American ..... 7½@ 8
Red, Indian, English ..... 4½@ 8½
Red, Indian, American ..... 3 @ 3½
Red, Turkey, English ..... 4 @ 6
Red, Tuscan, English ..... 7 @10
Red, Venetian, Amer. ₱ 100 ℔ .50@1.50
Red Venetian, English, ₱ 100 ℔ 1.25@1 75
Sienna, Italian, Burnt and Powdered ..... ₱ ℔ 3 @ 6½
Sienna, Ital., Raw, Powd ..... 3 @ 6½
Sienna, American, Raw ..... 1½@ 2
Sienna, American, Burnt and Powdered ..... ₱ ℔ 1½@ 2
Talc, French ..... ₱ ℔ 1½@ 2½
Talc, American ..... 75 @1.25
Terra Alba, French, ₱ 100 ℔ . 95 @1.00
Terra Alba, English ..... 95 @1.00
Terra Alba, American No. 1 ..... 65 @85
Terra Alba, American No. 2 ..... 45 @50
Umber, Turkey, Bnt. & Pow. ₱ ℔ 2½@ 3½
Umber, Turkey, Raw & Powd. 2½@ 3½
Umber, Bnt. Amer ..... 1½@ 2
Umber, Raw, Amer ..... 1½@ 2
Yellow, Chrome ..... 11 @14
Vermilion, American Lead ..... 10 @25
Vermilion, Quicksilver, bulk ..... @70
Vermilion, Quicksilver, bags ..... @71
Vermilion, English, Import ..... 80 @85
Vermilion Chinese ..... .80@1.00

Colors in Oil.
Black, Lampblack ..... 12 @14
Blue, Chinese ..... 36 @40
Blue, Prussian ..... 32 @36
Blue, Ultramarine ..... 13 @16
Brown, Vandyke ..... 11 @14
Green, Chrome ..... 10 @15
Green, Paris ..... @24
Sienna, Raw ..... 12 @15
Sienna, Burnt ..... 12 @15
Umber, Raw ..... 11 @14
Umber, Burnt ..... 11 @14

Miscellaneous.
Barytes, White Foreign, ₱ ton $17.50@20.00
Barytes Amer. floated ..... 18.50@20.00
Barytes, Crude, No. 1 ..... 10.00@11.00
Chalk, in bulk ..... ₱ ton 3.00@ 3.25
Chalk, in bbls ..... ₱ 100 ℔ @ 35
China Clay, English ..... ₱ ton 11.00@17.00
Cobalt, Oxide ..... ₱ 100 ℔ 2.50@ ...
Whiting, Common ..... ₱ 100 ℔ .45@ .48
Whiting, Gilders ..... .55@ .57
Whiting, extra Gilders' ..... .58@ .60

Putty.
In bladders ..... 1¾@2¼
In bulk ..... 1½@2
In cans 1 ℔ to 5 ℔ ..... 2¼@4¼
In cans 12 ½ ℔ to 25 ℔ ..... 1½@2¼

Spirits Turpentine.
In Oil bbls ..... 50½@50¾¢
In machine bbls ..... 59½@60¼¢

Glue.
Cabinet ..... ₱ ℔ 11 @15
Common Bone ..... 6 @ 8
Extra White ..... 18 @24
Foot Stock, White ..... 11 @14
Foot Stock, Brown ..... 7 @10
German Hides ..... 12 @18
French ..... 10 @40
Irish ..... 13 @16
Low Grade ..... 8 @11
Medium White ..... 14 @17

Cum Shellac— Cts. per lb.
Bleached ..... 47 @60
Button ..... 45 @55
Diamond I ..... 63 @ .
Fine Orange ..... 56 @57
A. C. Garnet ..... 45 @46
D. C ..... 70 @ .
T. N ..... 52 @53
V. S. O ..... 63 @ ..

Animal, Fish and Vegetable Oils.
Linseed, City, raw ..... ₱ gal. 37 @38
Linseed, City, boiled ..... 39 @40
Linseed, State and West'n, raw 35 @36
Linseed, raw Calcutta seed ..... @65
Lard, Prime, Winter ..... 58 @59
Lard, Extra No. 1 ..... 48 @50
Lard, No. 2 ..... 38 @
Cotton-seed, Crude, f.o.b mills. 30 @31
Cotton-seed, Summer Yellow, prime ..... 36 @36½
Cotton-seed Summer Yellow, off grades ..... 35½@36
Sperm, Crude ..... @55
Sperm, Natural Spring ..... 61 @62
Sperm, Bleached Spring ..... 63 @66
Sperm, Natural Winter ..... 65 @66
Sperm, Bleached Winter ..... 67 @68
Tallow, Prime ..... 48 @49
Whale, Crude ..... @ ..
Whale, Natural Winter ..... 46 @47
Whale Bleached Winter ..... 48 @49
Menhaden, Brown, Strained ..... 31 @32
Menhaden, Light Strained ..... 32 @33
Menhaden, Bleached Winter ..... 34 @35
Menhaden, Ex Bleached Winter 36 @37
Cocoanut, Ceylon ..... 5¾@ 6
Cocoanut, Cochin ..... 5¾@ 6
Cod, Domestic ..... 39 @40
Cod, Newfoundland ..... 40 @41
Red Elaine ..... 44 @45
Red Saponified ..... ₱ ℔ 5 @ 5¼
Olive, Italian, bbls ..... 48¼@ 53
Neatsfoot, prime ..... 54 @ ..
Palm, prime, Lagos ..... ₱ ℔ 6½@6¾

Mineral Oils.
Black, 30 gravity, 25@30 cold test ..... ₱ gal. 13 @14
Black, 29 gravity, 15 cold test. 14 @15
Black, Summer ..... 13 @14
Cylinder, light filtered ..... 20½@21¼
Cylinder, dark filtered ..... 18½@19½
Paraffine, 90°-907 gravity ..... 15 @15½
Paraffine, 903 gravity ..... 14 @14½
Paraffine, 885 gravity ..... 11¾@12¼
Paraffine, red ..... 14 @15½
In small lots ½¢ advance.

CURRENT METAL PRICES.

JANUARY 6, 1904.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from Store—

Refined Iron:	
1 to 1⅞ in. round and square	₩ ℔ @1.80¢
1½ to 4 in. x ⅜ to 1 in.	₩ ℔ @1.80¢
1½ to 4 in. x ¼ to 5-16	₩ ℔ @2.00¢
Rods—⅜ and 11-16 round and square	₩ ℔ @2.00¢
Angles:	Cts ₩ ℔
3 in. x ¼ in. and larger	2.15¢
3 in. x 3-16 in. and ⅛ in.	2.40¢
1½ to 2½ in. x ⅛ in.	2.05¢
1½ to 2¾ in. x 3-16 in and thicker	2.00¢
1 to 1¼ in. x 3-16 in.	2.05¢
1 to 1¼ x ⅛ in.	2.10¢
⅞ x ⅛ in.	2.25¢
¾ x ⅛ in.	2.35¢
⅝ x ⅛ in.	3.15¢
½ x ⅛ in.	3.65¢
Tees:	
1 in.	2.55¢
1¼ in.	2.35¢
1½ to 2¼ in.	2.25¢
3 in. and larger	2.40¢
Beams	2.35¢
Channels, 3 in. and larger	2.35¢
Bands—1½ to 6 x 3-16 to No. 8	₩ ℔ 2.30¢
"Burden's Best" Iron, base price	₩ ℔ 3.05¢
Burden's "H. B & S. Iron, base price	₩ ℔ 2.85¢
"Ulster"	₩ ℔ 3.10¢
Norway Bars	3.25@3.75¢
Norway Shapes	3.75@4.25¢

Merchant Steel from Store—

	per ℔
Bessemer Machinery	1.85¢
Toe Calk, Tire and Sleigh Shoe	2.00@2.50¢
Best Cast Steel, base price in small lots	7¢

Soft Steel Sheets—

¼ inch	2.30¢	No. 14	2.45¢
8-16 inch	2.30¢	No. 16	2.55¢
No. 8	2.30¢	No. 18	2.65¢
No. 10	2.35¢	No. 20	2.65¢
No. 12	2.40¢	No. 22	2.70¢

Sheet Iron from Store.

Black.

	One Pass, C. R. Soft Steel	R. G. Cleaned.
No 14	₩ ℔ 2.45	2.70¢
No. 16	₩ ℔ 2.55	2.80¢
Nos. 18 to 21	₩ ℔ 2.65	2.90¢
Nos. 22 to 24	₩ ℔ 2.70	3.00¢
Nos. 25 and 26	₩ ℔ 2.75	3.10¢
No. 27	₩ ℔ 2.80	3.20¢
No. 28	₩ ℔ 2.90	3.30¢

Russia, Planished, &c.

Genuine Russia, according to assortment	₩ ℔ 11¾@14¢
Patent Planished	₩ ℔ A, 10¢; B, 9¢, net.

Galvanized.

Nos. 14 to 16	₩ ℔, 2.93¢
Nos. 18 to 20	₩ ℔, 3.17¢
Nos. 22 to 24	₩ ℔, 3.41¢
No. 26	₩ ℔, 3.66¢
No. 27	₩ ℔, 3.90¢
No. 28	₩ ℔, 4.15¢
No 30	₩ ℔, 5.12¢

No. 20 and l ghter, 36 inches wide, 25¢ higher.

Foreign Steel from Store—

Best Cast	₩ ℔ 15 ¢
Extra Cast	₩ ℔ 18 @ 20 ¢
Swaged, Cast	₩ ℔ 16 ¢
Best Double Shear	₩ ℔ 15 ¢
Blister, 1st quality	₩ ℔ 13 ¢
German Steel, Best	₩ ℔ 10 ¢
2d quality	₩ ℔ 9 ¢
3d quality	₩ ℔ 8 ¢
Sheet Cast Steel, 1st quality	₩ ℔ 15 ¢
2d quality	₩ ℔ 14 ¢
3d quality	₩ ℔ 12 ¢
R. Mushet's "Special"	₩ ℔ 46 ¢
" " "Titanic"	₩ ℔ 19 ¢
Hobson's Choice XX Extra Best	₩ ℔ 35 ¢
Jessop Self Hardening	₩ ℔ 45 ¢
Seamans' "Nelson" Steel	40 ¢
Hobson's "Soho" Special Self-Hardening	₩ ℔ 43 ¢

METALS—

Tin—

Duty.—Pigs, Bars and Block. Free.

	Per ℔
Banca, Pigs	30 @30¼¢
Straits, Pigs	30 @30¼¢
Straits in Bars	30¼@30¾¢

Tin Plates—

American Charcoal Plates.

Calland Grade:	
IC, 14 x 20	$6.50
IX, 14 x 20	8.00
Helyn Grade:	
IC, 14 x 20	6.25
IX, 14 x 20	7.50
Allaway Grade:	
IC, 14 x 20	5.25
IX, 14 x 20	6.25

American Coke Plates—Bessemer—

IC, 14 x 20 ..108 ℔	$4.40@4.50
IX, 14 x 20	$5.50@5.60

American Terne Plates—

IC, 20 x 28	$8.60
IX, 20 x 28	$10.60

Copper—

Duty: Pig, Bar and Ingot and Old Copper free. Manufactured, 2½¢ ₩ lb.

Ingot—

Lake	13¼@13⅝¢
Casting	13 @13¼¢

Sheet and Bolt—

October 22, 1903. Net

Prices, in cents per pound. Sheet 30 x 60.

Not wider than	Not longer than	And longer than	64 oz. & over, 50 lb. sheet, 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lb.	24 oz. to 32 oz. 18¾ to 25 lb.	18 oz. to 24 oz. 14 to 18¾ lb.	14 oz. and 15 oz. 11 to 12½ lb.	12 oz. and 13 oz. 9⅜ to 11 lb.	10 oz. and 11 oz. 7½ to 9⅛ lb.	8 oz. and 9 oz. 6¼ to 7½ lb.	Lighter than 8 oz.
Ins.	Ins.	Ins.									
30	72	.....	18	19	19	19	20	21	23	25	28
30	96	72	18	19	19	19	20	22	25	28	
30	.....	96	18	19	19	19	21	25			
36	72	.....	18	19	19	19	21	23	26	29	
36	96	72	18	19	19	19	21	25	28		
36	120	96	18	19	19	20	22				
36	.....	120	18	19	18	21					
48	72	.....	18	19	18	21	23	26	29		
48	96	72	18	19	18	22	24	27			
48	120	96	18	19	21	23	27				
48	.....	120	18	19	22	25					
60	72	.....	19	19	20	22	25	30			
60	96	72	18	19	21	23	26				
60	120	96	18	20	22	25					
60	.....	120	18	21	23	27					
72	96	.....	18	22	22	27					
72	120	96	18	21	24	29					
72	.....	120	19	22	27						
108	96	.....	19	22	25						
108	120	96	20	23	26						
108	.....	120	21	24	28						
wider than 108	132	.....	22	25							
	.....	132	23	24							

Circles, Segments and Pattern Sheets, 3¢ ₩ ℔ advance over price of sheet Copper required to cut them from.
Cold or Hard Rolled Copper. 14 oz. ₩ square foot and heavier, 1¢ ₩ ℔ over the foregoing prices.
Cold or Hard Rolled Copper, lighter than 14 oz. ₩ square foot, 2¢ ₩ ℔ over the foregoing prices.
All Polished Copper, 20 in. wide and under. 1¢ ₩ ℔ advance over the price for Cold Rolled Copper.
All Polished Copper, over 20 in. wide, 2¢ ₩ ℔ advance over the price for Cold Rolled Copper.

Planished Copper—

1¢ ₩ ℔ more than Polished Copper.

Copper Bottoms, Pits and Flats—

14 oz. to square foot and heavier, ₩ ℔	24¢
12 oz. and up to 14 oz. to square foot, ₩ ℔	24¢
10 oz. and up to 12 oz., ₩ ℔	26¢
Lighter than 10 oz., ₩ ℔	29¢

Circles less than 8 in. diameter, 2¢ ₩ ℔ additional
Circles over 15 in. diameter are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1¢ ₩ ℔ extra.

Copper Wire—

Hard and Soft Drawn—B. & S. Gauge.
List Feb. 23, 1901.

Nos...0000 to 8	9 and 10		11 and 12
Base	1/6¢		1/4¢ ₩ ℔ adv.
Nos..... 13	14	15	16
	1/4¢	1/2¢	1¼¢ ₩ ℔ adv.
Nos..... 17	18	19	20
1¼¢	2¢	2½¢	2¾¢ ₩ ℔ adv

Seamless Brass Tubes—

Standard always Stubs' gauge, unless otherwise ordered.
Nov. 2, 1903. Net. Outside Diameter.

Stubs' W.G.	B. & S. W.G.	¼	5-16	⅜	7-16	½	9-16	⅝	¾	⅞	1	1¼	1½
4-11	8- 9	...	.....	..	.....	..	.....	.....	.....	.....	.....	18	18
12	10	...	.....	..	.....	..	.....	24	24	23	23	18	18
13	11	...	.....	..	.....	..	25	25	23	23	18	18	
14	12	...	.....	..	.....	25	25	25	23	23	23	19	19
15	13	...	.....	..	26	25	25	25	23	23	23	19	19
16	14	...	.....	26	26	25	25	25	23	23	23	20	20
17	15	...	29	26	26	25	25	25	23	23	23	21	21
18	16	29	31	27	27	26	26	26	24	24	24	22	22
19	17	29	31	27	27	26	26	26	24	24	24	23	23
20	18-19	30	31	27	27	26	26	26	24	24	24	24	24
21	20	62	47	29	28	26	26	25	25	25	25	25	25
22	21	67	52	31	31	29	29	27	26	26	26	26	26
23	22	72	57	33	33	31	31	29	29	29	29	29	29
24	23	77	62	49	44	42	41	41	39	37	36	36	37
25	24	82	67	52	47	45	43	42	41	40	40	41	42

Copper Bronze and Gilding Tube, 3¢ ₩ ℔ additional

Iron Pipe Sizes—Brass

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6 inch
36	33	29	27	21	21	21	21	21	21	21	23	23	25	27	28¢₩℔

Copper, Bronze or Gilding Tubes, 3¢ ₩ ℔ additional

Brazed Brass Tubing.

(*To No. 19, inclusive.*) June 6, 1898.
Brown & Sharpe's gauge standard.

	Per ℔.
Plain Round Tube, ¼ in. up to 2 in.	$0.35
" " ⅜ " ¾ "	.36
" " ½ " ¾ "	.38
" " 5-16 " ⅞ "	.41
" " ¼ " 5-16 "	.65
" " 3-16 " ⅛ "	1.00
" " ⅛ " 3-16 "	1.50
Smaller than ¼ inch	Special
2 inch to 3 in h, to No. 19, inclusive	.38
3 inch	.40
Over 3 inch to 3½ inch, inclusive	.45
Over 3½ inch	.50

Bronze and Copper, advance on Brass List, 3 cents.
Discount from list 25%

Roll and Sheet Brass—

(*Brown & Sharpe Standard Gauge.*)

Common High Brass Wider than and including	in. 2	in. 12	in. 14	in. 16	in. 18	in. 20	in. 22	in. 24
	12	14	16	18	20	22	24	26
To No. 20 inclusive	.22	.23	.25	.27	.29	.31	.33	.36
Nos. 21 22, 23 and 24	.23	.24	.26	.28	.30	.32	.34	.37
Nos. 25 and 26	.23	.24¼	.27	.29	.31	.33	.35	.38
Nos. 27 and 28	.23	.25	.28	.30	.32	.34	.36	.39

Common High Brass. Wider than and including	in. 26 28	in. 28 30	in 30 32	in. 32 34	in. 34 36	in. 36 38	in. 38 40	in. 40
To No. 20, inclusive	.39	.42	.46	.50	.55	.60	.65	*
Nos. 21, 22, 23 and 24	.40	.43	.47	.51	.56	.61	.68	
Nos. 25 and 26	.41	.44	.48	.52	.57	.63	.71	
Nos. 27 and 28	.42	.45	.49	.53	.58	.65	.75	

* Special prices not less than 80 cents.
Add ¼¢ ₩ ℔ additional for each number thinner than Nos. 28 to 38 inclusive. Discount from List 25%

Wire in Coils. List February 26, 1896.

Brown & Sharpe's gauge the standard.	Com. high brass.	Low brass.	Gilding bronze and copper
All Nos. to No. 10, inclusive	$0.23	$0.27	$0.28
Above No. 10 to No. 16	.23½	.27½	.28½
No. 17 and No. 18	.24	.28	.32
No. 19 and No. 20	.25	.29	.33
No. 21	.26	.30	.34
No 22	.27	.31	.35
No. 23	.28	.32	.36
No. 24	.30	.34	.38
No. 25	.32	.36	.40
No. 26	.35	.39	.43
No. 27	.38	.42	.46
No. 28	.42	.46	.51
No. 29	.45	.49	.54
No. 30	.48	.52	.62
No. 31	.51	.55	.67
No. 32	.55	.59	.73
No. 33	.59	.63	.82
No. 34	.64	.68	.95
No. 35	.70	.74	1.30
No. 36	.76	.80	1.50
No. 37	1.00	1.04	1.70
No. 38	1.30	1.34	2.00
No. 39	2.00	2.00	3.25
No. 40	2.60	2.60	5.75

Discount, Brass Wire, 25%; Copper Wire, NET.
List November 16, 98.
Spring Wire, 2¢ ₩ ℔ advance.

Tobin Bronze—

Straight, but not turned, Rods, ⅝ to 3 in. diameter, ₩ ℔, net	18¢
Finished Piston Rods, ⅜ to 2½ in. diameter, ₩ ℔ net,	19¢

Other sizes and extreme lengths, special prices.

Spelter—

Duty: In Blocks or Pigs, 1¢ ₩ ℔

Western Spelter	5¾@6 ¢

Zinc.

Duty: Sheet, 2¢ ₩ ℔.

No. 9, base casks	6½¢	Open, per ℔	7¢

Lead.

Duty: Pigs and Bars and Old, 2½¢ ₩ ℔. Pipe and Sheets, 2½¢ ₩ ℔.

American Pig	4¾@4.85¢
Bar	5¼@5¾¢
Pipe	₩ ℔ 45@6.5¢
Tin Lined Pipe	₩ ℔ 12¢
Block Tin Pipe	₩ ℔ 37¢
Sheet Lead	₩ ℔ 5¾@6¢
Old Lead in exchange, 3½¢ ₩ ℔	

Solder.

¼ & ¼, guaranteed	19 @19½¢
No. 1	17 @17½¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Duty, ¾¢ ₩ lb.

Cookson	₩ ℔ 7¼@7⅝¢
Hallett's	₩ ℔ 6¾@6⅞¢

Aluminum—

Duty: Crude, 8¢ ₩ ℔. Plates, Sheets, Bars and Rods, 13¢ ₩ ℔.

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting:

Small lots	₩ ℔ 37¢
100-℔ lots	₩ ℔ 35¢

No. 2 Aluminum (guaranteed to be over 90% pure), in ingots for remelting:

Small lots	₩ ℔ 34¢
100-℔ lots	₩ ℔ 33¢

Aluminum Sheet, B. & S. gauge. 50 ℔ or more

Wider than	6-in. ₩ ℔.	14-in. ₩ ℔.	24-in. ₩ ℔
And including	14-in.	24-in.	30-in.
Nos. 13 to 19	$0.42	$0.44	$0.47
No. 20	.44	.46	.49
Nos. 21 to 23	.46	.48	.51
No. 24	.48	.50	.53
No. 25	.47	.51	.54
No. 26	.47	.54	.59
No. 27	.48	.57	.62
No. 28	.48	.57	.64
No. 29	.49	.60	.69
No. 30	.50	.64	.77

Note.—Lots of less than 50 ℔ 5¢ ₩ ℔ extra.

Aluminum Wire, B. & S. Gauge.

Larger than No. 9	₩ ℔ 40¢	No. 15	₩ ℔ 43¢
No. 9 to No. 10	₩ ℔ 40.5¢	No. 17	₩ ℔ 50¢
No. 11	₩ ℔ 41 ¢	No. 18	₩ ℔ 53¢
No. 12	₩ ℔ 41½¢	No. 19	₩ ℔ 60¢
No. 13	₩ ℔ 42 ¢	No. 20	₩ ℔ 65¢
No 14	₩ ℔ 43½¢	No. 21	₩ ℔ 85¢

Old Metals.

Dealers' Purchasing Prices Paid in New York.

Heavy Copper	₩ ℔	10½¢
Light and Tinned Copper	₩ ℔	9½¢
Heavy Brass	₩ ℔	7 ¢
Light Brass	₩ ℔	5 ¢
Lead	₩ ℔	3½¢
Tea Lead	₩ ℔	3½¢
Zinc	₩ ℔	3½¢
No. 1 Pewter	₩ ℔	17 ¢
No. 2 Pewter	₩ ℔	15¢
Pure Aluminum, Sheet, ₩ ℔		21¢
Cast Aluminum, ₩ ℔		16¢
Tin Plate scrap	₩ ton	$4 50@5 00
Wrought Scrap Iron	₩ gross ton	$11.00@11.50
Heavy Cast scrap	₩ gross ton	$9.50@10 00
Stove Plate Scrap	₩ gross ton	$8.00@ 8.50
Burnt Iron	₩ gross ton	$6.00@ 6.50